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A MENACE TO THE NEW YORK HARBOUR ENTRANCE.*

BY

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These restless surges eat away the shores
Of earth's old continents; the fertile plain
Welters in shallows, headlands crumble down,
And the tide drifts the sea-sand in the streets
Of the drowned city.
WM. CULLEN BRYANT.

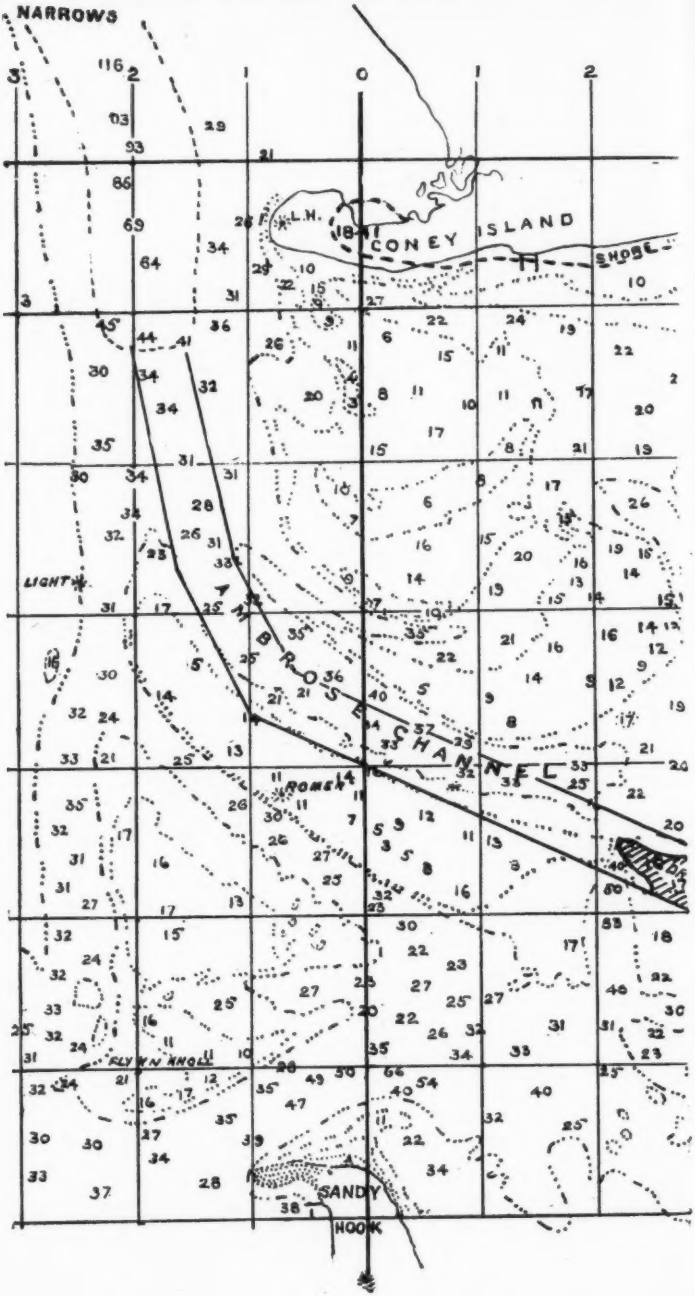
At the Buffalo meeting of this association, in 1886, the writer had the honour of submitting a paper on the "Problem of the New York Entrance," in which were set forth the peculiar physical conditions existing on the bar stretching from Sandy Hook to Coney Island, and suggesting a method of so modifying the ebb current passing out at Gedney's Channel as to increase the depth by natural erosion.

At that date the limiting depth in this, the deepest natural channel, was 23·3 feet at mean low water, which, with a mean tide of 4·8 feet, gave 28·1 feet at high stages, so that vessels drawing 27 feet have passed over it at extreme high water prior to improvement by dredging. In 1884 a report was submitted to Congress urging the enlargement of the channel to a width of 1,000 feet and depth of 30 feet by dredging, at an estimated cost of $970,000, as follows:

Improving Gedney's Channel for 30 ft., M.L.W.....	700,000 c. y., at 50 cts.
Improving Main Channel for 30 ft., M.L.W.....	1,550,000 c. y., at 40 cts.

and it was expected that these channels would be "self-sustaining for many years." The Board of Engineers dissented from this

* A paper read before the annual meeting of the American Association for the Advancement of Science, held at Philadelphia, December 26–30, 1904. (*From advance sheets, by courtesy of the Franklin Institute.*)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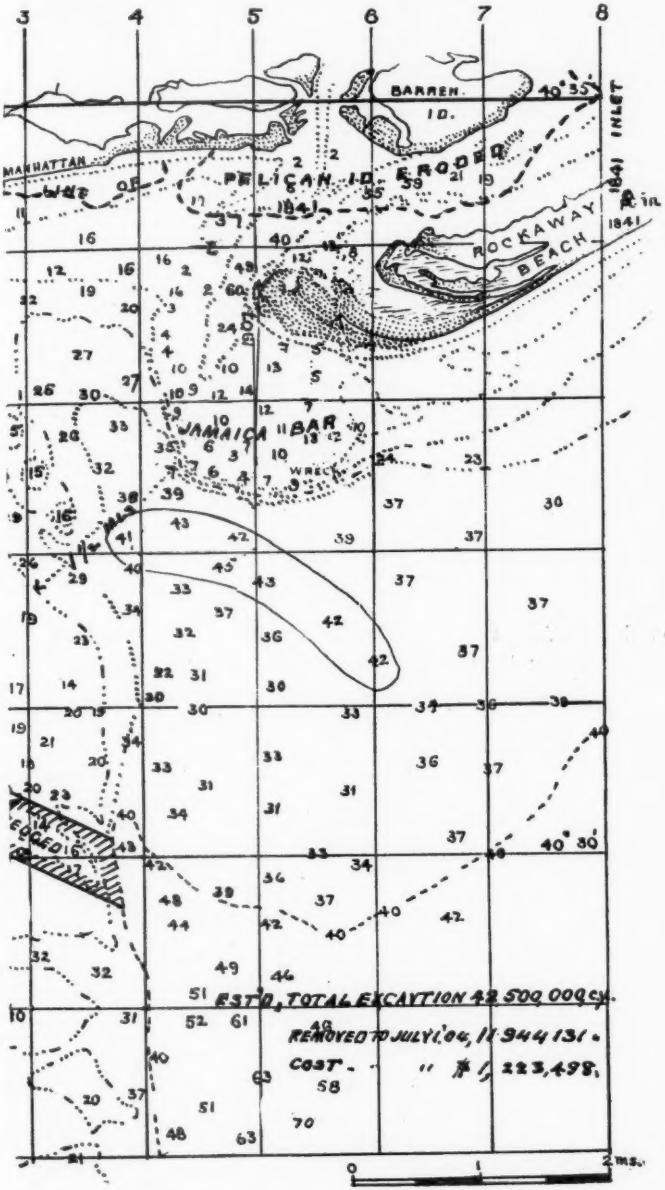
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view, however, and stated that it had "little expectation that anything more than temporary relief could be obtained from dredging on a bar exposed to the full force of the Atlantic, and hence cannot recommend that method for a permanent improvement." It therefore suggested a dike extending in a S.-S.E. direction from Coney Island at a cost of about $5,000,000 or $6,000,000. As this dike would have closed the Coney Island, Fourteen Foot, and East Channels, and would have reduced the tidal ingress, it was not built, and the method of dredging alone was adopted. The Board was fully cognizant of the fact that the sand was being moved from the adjacent shore of New Jersey and Long Island into the Lower Bay, as indicated by the spits at Sandy Hook and Coney Island; but the extent of this movement does not appear to have been very fully considered, although an important factor in the relative cost of creating and maintaining the channels. Especially is this true in view of the greater demands which modern vessels are exacting as to capacity and draught. Instead of 30 feet depth and 1,000 feet width, there are now required 40 feet and 2,000 feet, respectively.

It has also been found necessary to maintain the 30-foot channels by dredging at an annual charge of about $50,000, with no resulting increase of depths, so that in 1899 the project of opening a more direct channel *via* the East or Ambrose passage by dredging to a depth of 40 feet and a width of 2,000 feet was approved by Congress, provided the cost should not exceed $4,000,000 for the removal of the 42,500,000 cubic yards then in place.

Under the 30-foot projects the amount expended up to July 1, 1904, was $1,967,111.82, or about $1,000,000 more than the estimate even at the very high unit prices of 40 and 50 cents per yard.

Under the 40-foot project, to same date, there has been expended $1,223,498.52, and "11,944,131 cubic yards have been removed." From this statement it appears that the general cost has been 10¼ cents per yard in the Ambrose Channel.

In the report of the Board, composed of Generals J. C. Duane, Henry L. Abbott and C. B. Comstock, three of the most experienced members of the Corps of Engineers, it was stated that the movement of sand towards the New York entrance was manifested by the "form of Sandy Hook, a sand spit about 5 miles long, which has been slowly built during past ages by this northward movement of sand along the New Jersey shore. It appears to have reached a limiting length . . . and in the last 145 years its length has varied only about 2,700 feet. . . . An examination

of the charts of Coney Island shows that its western end is moving westward as sand is moved to it, the motion of its 18-foot curve amounting to 800 feet between 1835 and 1881."

Unfortunately, this report does not appear to state the probable amount of material carried on to the bar by these two littoral movements. It is to set forth the great importance of providing for this menace to the entrance in the near future that some attention will be given to it in this paper. While physicists may be more especially interested in the vertical movements of the earth's crust, as suggested in the recent paper of Prof. J. W. Spencer on the submarine Great Cañon of the Hudson River, these internal forces do not appear to have sensibly affected the depths of the channels for commercial purposes within the range of modern records, so that the investigation of the volume and rate of drift will be confined to its horizontal littoral transportation.

For this purpose the British, Dutch, Swedish, and Spanish charts of the early explorers and settlers of the seventeenth century are found to be of no value, being apparently merely a collection of itinerary sketches of the general conformations of the coast, as seen from their vessels. Neither are movements which have passed their climaxes and reached a condition of equilibrium, or which are undergoing a transition under the new conditions which previous cycles may have imposed, as exemplified in the successive hooks which characterize the peninsula of Sandy Hook, where the third reflex spit is now forming.

Data.—An early colonial map of 1626 shows Sandy Hook under the name of Goodwin's Point, after whom the Lower Bay was also named, but it gives no geographical positions. The first charts of value for comparative study to which the writer has had access are those in the American Atlas, published by Wm. Faden, Charing Cross, London, in 1779, and collated by British officers during the Revolution. One of these, by Lieutenant Bernard Ratzer, of the Sixtieth Regiment, drawn from a survey of 1769, shows the New York Bay and Long Island on a scale of 6.6 miles to an inch. Another, being a detailed survey of the Hudson River and its mouth, published October 1, 1776, is on a scale of 4 miles to an inch, and a third, by Claude Joseph Sauthier, representing the entire State in sections, scale about 5 miles to an inch, was published in 1779. These three have been reduced to the same scale of 5 miles to the inch and superimposed for comparison as to position of shore-lines. The discrepancies, smallness of scale, and uncertainty of dates are such as to render them of comparatively little value, but they

show the progressive movements of the inlets to the bays on the south shore of Long Island and the opening and closing of the breach at the mouth of the Shrewsbury River, N. J. Also the beginning of the outer beach, now covering "Rockaway Neck" and Jamaica Bay, and threatening the New York bar. The State map of 1779 makes the distance from the Battery of New York City to Sandy Hook Light only 14 miles, instead of nearly 17 as given by the Coast Survey charts, thus discrediting its accuracy and confining this investigation to the later and absolutely reliable charts of the U. S. Coast and Geodetic Survey and those of the U. S. Corps of Engineers.

Co-ordinates.—As a basis of orientation the Sandy Hook Lighthouse is taken as the origin, since its co-ordinates are practically identical on the British and American charts.

The axes of reference are the meridian of the lighthouse and the parallel of 40° 20′ 35″ N. latitude. On this meridian and parallel therewith, cross-sections have been constructed from the Coast Survey charts of 1841 and 1901 by dividing the arc of latitude into minutes (or 4,620 feet intervals) and taking the sectional area of the water extending for a distance of 3 knots southward. The area thus covered extended about 7·5 knots east and 3 south, embracing the travelling bank in front of Jamaica Bay and reaching beyond the old inlet of 1841.

The gain or loss in the water cross-sections indicates the amount of erosion or deposit in the past sixty years; but it should be noted that this is merely the local resultant change, and that it by no means represents the total movement of drift. This latter quantity can best be ascertained only when it is finally impounded in the bight of some re-entrant having no internal tidal compartments. Along an open beach with numerous receptive inlets and a great bay at its terminus, all acting as pockets for sand, it is indeterminate, except by constructing an extensive groin to intercept it. Along an unbroken beach the volume of drift may be very large, yet the net changes, after its equilibrium is established, may be very small, or zero. When a breach occurs, however, the sand enters, and is precipitated on the inner bars and islands, until the inlet drifts past, and the bay or sound becomes closed to the littoral material, which then travels on to the next dump. The outer bar resulting from the effluent currents of the bay modifies to a great extent the action of the littoral forces by deflecting them in part around the submerged obstruction which they are constantly attacking on the windward side, from which the sand is

eroded and carried by a circuitous path to the leeward slope. At the toe of this latter slope and along the beach front beyond the bar there is apt to be erosion from the eddy caused by the returning currents. These generalities are illustrated by the following tabular exhibit computed from the cross-sections of the Coast Survey charts of 1841–1901, with such intermediate sections as were necessary to locate the scarps and counterscarps of the channel at these dates, or after sixty years' interval. The sections are arranged from east to west, to follow the direction of the movement. Between Nos. 7½ and 10, inclusive, there has been an increase of the water section or scour, but auxiliary sections extending farther east to Rockaway Life-saving Station show no material change, unless it be a deepening beyond the five-fathom curve. Between the Jamaica and New York bars there has been a small amount of scour in the flood-tide channel under Coney Island, and a recession of the beaches, which is pronounced along Plumb and Pelican Islands. A submerged ridge has formed in this trough, which has reduced the depths from 28 to 15 feet—a loss of 13 feet.

COMPARATIVE MARINE CROSS-SECTIONS OF VICINITY OF JAMAICA INLET, EXTENDING FROM THE MERIDIAN OF SANDY HOOK LIGHT EASTWARD 46,200 FEET, 8.75 STATUTE MILES, AND SOUTHWARD FROM LATITUDE 40° 35′ N. THREE KNOTS. FULL INTERVAL = 4,620 FEET.

NO.	DATE 1841. SQ. FT	DATE 1901. SQ. FT.	DECREASE. FILL — SQ. FT.	INCREASE. SCOUR +.	VOLUME. CUB. YDS. DEPOSITED.	REMARKS.
10	384,635	433,323	—	48,688	—	—
9	256,829	338,381	—	81,552	—	—
8	241,847	266,568	—	24,721	—	—
7½	172,842	253,177	—	80,335	—	Scarp of 1841.
7	323,775	227,616	96,159	—	2,079,000	Through inlet and bar of 1841.
6½	288,476	232,485	45,991	—	5,250,000	Counterscarp of 1841.
6	293,345	216,661	76,684	—	6,160,000	—
5½	320,123	189,883	130,240	—	8,840,000	Scarp of 1901 { Deposited outside, 182,580 / Scour inside..... 52,340
5	329,861	202,055	127,806	—	11,300,000	Gorge of 1901.
4½	355,422	233,702	121,720	—	13,700,000	Counterscarp.
4	322,581	402,893	80,312	—	5,555,000	—
3	323,775	283,607	40,168	—	10,000,000	—
2	206,924	234,919	—	27,995	2,000,000	—
1	158,236	186,231	—	27,995	—	—
0	121,937	139,978	—	18,041	—	On Sandy Hook Meridian.
Av.	273,374	249,432	23,942		64,844,000	Deposited in 60 years±.

The difference of the mean sections gives an average reduction of 23,942 square feet, or about 900 cubic yards per lineal foot, which for the total distance of 46,200 feet would give 693,000 yards per year as compared with the nearly 1,100,000 as included in the bar reach and representing its annual increment.

The bar proper covers a length along the beach of about 3½ miles and extends seaward nearly the same distance, while the direction of its movement has changed since passing Rockaway Station from west to nearly southwest, and this, if continued, will pass through the Light on the Romer Shoal and bisect the Ambrose Channel. It is now but 2½ miles distant from the 6-foot contour of the Jamaica bar to the 14-foot depth at the end of the new channel. There are no points between reaching to 40 feet excepting a small basin ½ mile wide, having one sounding as great as 46 feet, and as the Jamaica bar rolls up on the outer slope of the main ridge with its diminishing depth, the rate of progress will be more rapid and the distribution of material more extensive.

The table above shows the maximum reduction of the cross-section of the waterway at Station 5½ (the present scarp) to have been 130,240 square feet, which is greater than the entire area of the waterway for the 3 knots covered by the initial section at Station O, so that there is not space on the bar for this deposit without spreading to the southward and flowing into the channel, just as the spit at Sandy Hook is now changing its direction and moving to the westward as the ramparts of the sea encroach upon the gateways of the tide.

Rate of Approach.—Under these conditions the question naturally arises as to how soon this great increase in the volume of material may be expected to reach the bar, and it is one more readily answered than that of quantity, since a comparison of the authentic Coast Survey charts from 1841 furnishes evidence that the progression of the easterly spit of Jamaica Bay has been 2⅞ miles in sixty years, or at the annual average of 253 feet—that is, 1 mile in 20·86 years. If the British chart of 1776, made by Sauthier, be taken as reliable, the rate has been about 7 miles in 125 years, or 295 feet per annum. One mile in eighteen years, nearly.

As a further check under somewhat similar conditions of exposure and activity the charts for Fire Island show a westerly drift of 11,600 feet in 52 years, or 224 feet a year. The Board of Engineers of 1897, in reporting on the conditions at Aransas Pass, Tex., on the Gulf of Mexico, stated that "for many years it moved in a southerly direction. . . . The annual rate of movement from 1868 to 1878 was about 260 feet."

These few instances will serve to show that a movement of about 260 feet a year is not abnormal, and may be accepted as safe, so that the 40-foot basin should be crossed in about ten years, after which the rate should be more rapid in mounting the scarp of the

outer bar. As it will require about ten years to remove the original material in place, in the Ambrose Channel, which is already reported to have filled from 3 to 7 feet, where work has been done, it will be seen that the problem assumes a serious aspect, and there would seem to be no question as to the futility of attempting to create, and especially to maintain, a channel by "dredging on a bar exposed to the full force of the Atlantic," which the Board of 1884 could not recommend for its permanent improvement. But this is not all; for, while the marine forces of the Long Island littoral are so rapidly storming the left flank of the enceinte, those of the New Jersey coast are likewise attempting to turn the right and rear. It is, therefore, necessary to reconnoitre in this direction to ascertain the force of the enemy and his line of approach.

Growth of Sandy Hook.—The encroachment of this peninsula of sand, extending northwardly across the entrance for a distance of five miles, has long been a subject of investigation and a cause of alarm, lest it ultimately close this portal to the harbour. The U. S. Coast Survey Commission made a special report on this subject in 1857, in which it said:

> The disastrous result of the continued growth of Sandy Hook into the main ship channel, its progress having been for the last century at the rate of nearly "a sixteenth of a mile in twelve years," needs no exaggeration to give it importance. . . . If its encroachments in the same direction were continued beyond certain limits, the destruction of the harbor might ensue.
>
> Within twenty years (1835–55) the point has grown to the northward 220 yards. It is altogether probable that the future progress of commerce will render the deepening of the bar a vital question.

The half century just closed has fully confirmed these predictions, and lends weight to the need of a more extended analysis of the rate and direction of the drift which is gradually throttling this mouth of the bay. The rates of growth above cited give an average of twenty-six feet per annum for the century, and 33 feet for the score of years, but the variations in the progress of the spit will be more clearly exhibited by the subjoined tabular statement, compiled from numerous charts, some of which are of doubtful authenticity, and hence of little weight. As the opening and closing of the mouth of the Shrewsbury River at the foot of the Hook is a factor in the travel of drift, an effort has been made to determine the dates when open. An old provincial map of New Jersey, published by Seller and Fisher in 1676, shows a small projection of $\frac{1}{10}$ of an inch in length on the site of Sandy Hook, connected with the mainland; but as there is no scale, it is valueless. A map of New York and Perth Amboy Harbours in 1733, drawn to scale and apparently made from surveys, is taken amongst the earliest reliable maps for this study. On this chart the Hook is but three miles long, which is apparently erroneous as compared

with Lay's map of 1724. The depth of 19 fathoms in the Narrows and 3½ in the main Ship and Gedney's Channels are the same as those prior to the dredging, commenced under the project of 1884.

MOVEMENTS OF SANDY HOOK AND CONDITION OF SHREWSBURY INLET.

DATE (YEAR).	LENGTHS (MILES).	FEET.	AUTHORITY.	INLET CLOSED OR OPEN.	AVERAGE RATE PER ANNUM IN FEET.	REMARKS.
1724	4·00	21,120	Amos Lay.	Closed.	For 50 years to 1776 there seems to have been no advance.	Scale $7^m = 1''$
1733	3·00*	15,840	Not stated.	"		" $3\frac{1}{3}^m = 1''$
1769	3·96	20 909	Lt. Ratzer.	"		" $6\frac{2}{3} = 1$
1776	4·00	21,120	(Hudson River.)	"		" $4^m = 1''$
1778	4·40	23,232	"Lord Howe."	Open.	1,056	" $\frac{3}{4} = 1''$
1779	4·4	23,232	C. J. Sauthier.	"	0	" 5 $= 1''$
1782	4·5	23,760	Lt. J. Hills.	"	176	" $\frac{1}{10000}$
1819	4·53	23,918	Capt. LeConte.	Closed.	4	" "
1836	4·67	24,657	U. S. C. Survey.	Opened in 1835.	43	" "
1841	—	—	"	"	—	" "
1842	4·80	25,344	"	Closed.	114	" "
1844	4·83	25,520	"	—	88	" "
1848	4·83	25,520	"	Open.	0	" "
1850	4·80	25,344	"	Closed.	− 88	" "
1851	4·78	25 388	"	Open.	+ 44	" "
1855	4·77	25,335	"	Closed.	− 13	" "
1857	5·00	26,400	"	" †	+ 530	† Permanently by railroad.
1863	—	—	—	"	—	Severe storm cut away, making jetties and rip-rap necessary, 2,575 feet long.
1881	4·9	25,872	—	"	− 26	
1891	4·8	25,344	U. S. C. Survey.	Closed.	− 75	Scale $\frac{1}{10000}$

A glance at the rate-column shows some very eccentric features, and impresses the need of systematic records at stated periods as a basis for definite conclusions. It would appear that, for the half century from 1724 to 1776, the spit was in a condition of equilibrium (neglecting the survey of 1733). During Lord Howe's occupation a spit of sand nearly half a mile in length extended to the north-west, and the fast land soon followed it. Another cycle occurred between 1779 and 1848, a period of sixty-nine years, during which ·43 of a mile, or 2,288 feet, were reclaimed from the sea, giving an average progression of 33 feet per annum. Since 1848, whilst there has been fluctuation, there is no material advance upon the channel northwardly, but instead there has been a protrusion of a long spit

* Distance uncertain. † Six feet deep.

of a half mile to the westward, forming the third cove on the inner face of the Hook.

The revetment of the head of the Hook after the severe storm of 1863 checked the erosion to some extent.

In 1881 the nucleus of the westward movement was shown to have commenced. Taking the depth at 45 feet, with slopes of 1 on 12, this deposit to date would represent approximately 10,000,000 cubic yards, or about a half-million a year, which has been arrested under the lee of the Hook, notwithstanding the inner littoral current which prevails for eleven hours out of the twelve. This does not represent, by any means, the additional amount of sediment carried into the bay in suspension and deposited in its channels and on its bars. The annual dredging required to maintain the full dimensions of Gedney's Channel, especially on the south side of the cut, indicates the presence and source of this material.

This may be checked by the larger deposit made on the Hook proper between 1776 and 1857, when it advanced nearly a mile in length and expanded to a mean width of a mile. The uncertain element in this computation is the mean depth of the bed, but as there is always a deep-water reaction basin at the head of such spurs reaching to between 50 and 60 feet, it is safe to assume the depth of the fill at 15 yards. With these dimensions the yearly deposit has been 581,000 cubic yards on the fast land of the Hook, thus confirming within reasonable limits the probable annual deposit in this vicinity to be in round numbers 500,000 cubic yards. The northern mile of the Hook contains about 46,500,000 yards in place.

Unfortunately, the data contained in the above table furnish an uncertain basis from which to determine the age of Sandy Hook, but in the period of eighty-one years between 1776 and 1857 it apparently advanced one mile, or at the rate of about 65 feet per annum. To cover the entire five miles at this rate would require about four centuries, leading back to the date of the discovery of America. It is highly probable that the rate was much less at an earlier date, when the coast to the southward was indented with numerous inlets, which have nearly all been closed by the northward littoral drift and converted into fresh-water lakes. The only important openings to-day are those of Shark River and Manasquan, until Barnegat is reached, where the drift is to the southward.

From the foregoing statements it would appear that both flanks of the entrance are menaced by large deposits of sand in place, whilst the flood-tide is augmenting this volume by material carried

in suspension, thus hastening the deterioration of this entrance by these encroaching banks.

THE GREYTOWN HARBOUR.

That this is no idle fancy will appear from a brief consideration of the physical conditions at the mouth of the San Juan del Norte at Greytown, Nicaragua, upon which so much stress has been laid in recent years. Here the trade-wind, rather than the tide, is the predominating element to drive the waves to the westward and extend the Hook in that direction, so that the excellent roadstead which existed in 1832 was completely sealed in 1865, during which period of thirty-two years the spit had advanced over a mile and a half, moving at an average rate of 291 feet each year.

A careful computation from comparative cross-sections of this cordon of sand, covering a period of some forty years, made by the writer on the spot in December, 1897, gave the annual deposit as 582,000 cubic yards during the latter part of the movement.

By a comparison of the survey of Commander Lull, of 1872, with that of Captain West, of 1865, covering a little more than seven years, after the lagoon had been formed, Prof. Henry Mitchell estimated the average yearly deposit on the sea slope of Punta Arenas to be 730,000 cubic yards. Here the coastal plain is characterized by five distinct lagoons—Ibo, Barco, Sucio, Shepherd's, and Greytown—having their axes nearly parallel and from 3,000 to 3,750 feet apart, all to leeward of the salient and within three miles of the coast, thus demonstrating the persistence of the forces and their cyclic results. The short pier of 1,000 feet, built by the Maritime Canal Company, arrested this drift and caused a general advance of the shore-line to windward for a distance of more than a mile. It also opened and maintained a channel into the lagoon until the groin filled up. This typical instance is cited to illustrate the gravity of the encroachments upon the New York bar where the aggregate deposits are more than twice as great, being concentrated from both the Long Island and New Jersey coasts, as from a funnel, upon the bar stretching from Coney Island to Sandy Hook.

Land Titles.—Aside from the physical, engineering, or commercial importance of this question there is the legal one of proprietorship. Stakes, pins, or landmarks driven into these travelling beaches do not hold them down, and the inaccuracies of the early colonial surveys and descriptions are so vague as to lead to great confusion. In a Supreme Court decision rendered in July last in favour of the town of Hempstead, Long Island, the defendant, based

upon surveys several centuries old, the Court ruled "That old maps of the beach on Long Island are but slight evidence of the condition of the beach or the location of the inlets at a period fifty years earlier, even though correct at the time made. It is a fair presumption that the constant shifting in the various inlets of Rockaway Beach, on Long Island, shown to be going on at the present time, was going on in 1725." From this it appears that such a description as is contained in the deed of "A beach lying on the south side of the Island at a place called Rockaway" is not such as would convey title to a definite tract of land subject to the action of such physical forces. For the purpose of preserving to the rightful owner the full possession of his property, therefore, it becomes of importance to establish well-defined reference marks and to ascertain by frequent and systematic examinations the character and amount of the changes which are taking place as a basis for the best method of reclamation and protection to riparian owners, with correlative aid to commerce and marine industries.

The Remedy.—In view of the situation the preventive measures seem to be self-evident; yet thus far no permanent regulating works are contemplated which look to the modification of the tidal forces, either to diminish the rate of encroachments from the flood-driven sand-bars or to augment or localize the energy of the ebb scour, so that it is risking nothing to say that the Board of 1884 was correct in its judgment as to the inexpediency of attempting to meet the demands of commerce by dredging. If it were true then it is more so now, and yet it is quite possible so to control the ebb currents by a permanent training wall as to cause them to cut out and maintain by their own energy an ample channel across this bar. Such a structure would not obstruct nor close any of the existing channels, but would protect the Ambrose Channel from drift and would cost only about one-half the amount estimated for merely the preliminary dredging of the proposed channel. This should be supplemented by auxiliary works to impound the travelling sands in natural depositories, where they will become valuable instead of injurious, and prevent the ultimate formation of a new beach in front of Manhattan and Coney Island, which would then be on a bay a mile or more from the sea.

The details as to plans, dimensions, mode of construction, materials, and cost of these works belonging more properly to the subject of the Engineering Section, are consequently omitted from this paper, which is respectfully submitted for discussion, though with a consciousness of the deficiency and unreliability of the earlier data.

THE LAKES BESIDE THE LOWER TARIM.

BY

DR. SVEN HEDIN.*

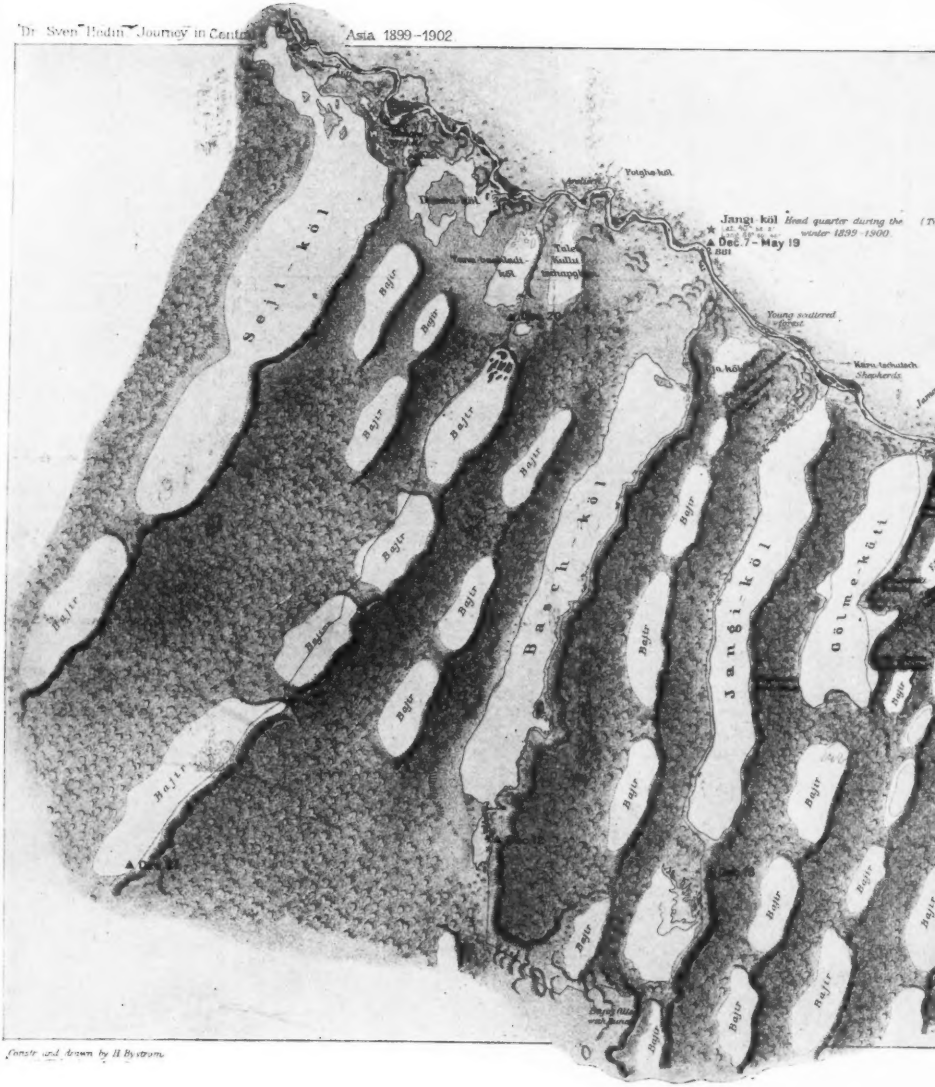
It was on the 6th and 7th December, 1899, that I passed the first links in the chain of curious lakes which stretches along the right bank of the Tarim after it turns to the southeast, or, generally speaking, along the stretch between Karaul and Arghan. These lakes are in every respect of such a strange and uncommon character that at the first glance it is impossible to understand how they can have originated or how the contours and the hydrographical relations of the region can have contributed to their formation. One would naturally suppose that, the river here washing the feet of sand-dunes 90 meters high, this would be precisely the last quarter in which to look for the creation of lacustrine basins. And yet it is in this very locality that we find a continuous series of lakes possessed of a depth greater than we find in the river itself immediately adjacent. I have investigated and sounded some of these accumulations of water, and will now proceed to describe them in order, and thereafter deduce the conclusions which are directly suggested by the ascertained facts.

But before proceeding to discuss my own experiences, I ought to state first what was already known about these lakes—and it is not very much. The only traveller who has visited the region is M. V. Pjevtsoff, though he can only have seen the dunes at a distance. What he says about them is as follows:

Southwest of the Jarkent-darja extends the lifeless desert which the natives call Kettek-schaarikum. It is covered by gigantic accumulations of sand, lying almost north and south, and between them are sandy expanses, consisting of low, flat *barkhans*, which resemble waves of the sea. The stupendous sand ridges approach in several places almost to the very brink of the river, though in other places they are as much as 10 versts from it; everywhere, however, they are plainly visible from the road. It is not so very long since the wild camel used to frequent this desert, and the natives to hunt him in the autumn and winter, but ten years ago he disappeared and took up his habitat elsewhere. The last wild camel is reported to have been seen amongst the sand south-west of the village of Jangi-su. The native hunters are of opinion that these wild animals have travelled southwards down the lower Jarkent-darja (Tarim), and thence made their way up to the Tscherschen-darja to the stony, sandy desert which extends southwest of the locality of Vasch-schaari, where it is commonly reported that the wild camel is still to be found in large numbers. . . . .

* The remarkable lakes which Dr. Sven Hedin discovered during his last visit to Central Asia are described in Vol. 1 of his "Scientific Results of a Journey in Central Asia, 1899-1902." His description and explanation of the existence of these lakes in the desert are given here so far only as to convey an idea of their present aspects and probable genesis (Chap. XVI, pp. 227-230, and Chap. XIX, pp. 305-306). A photographic reduction of sheet 12 of Dr. Hedin's Atlas shows the relations of the lakes to one another, the Tarim River, and the sand-dunes.

XUM

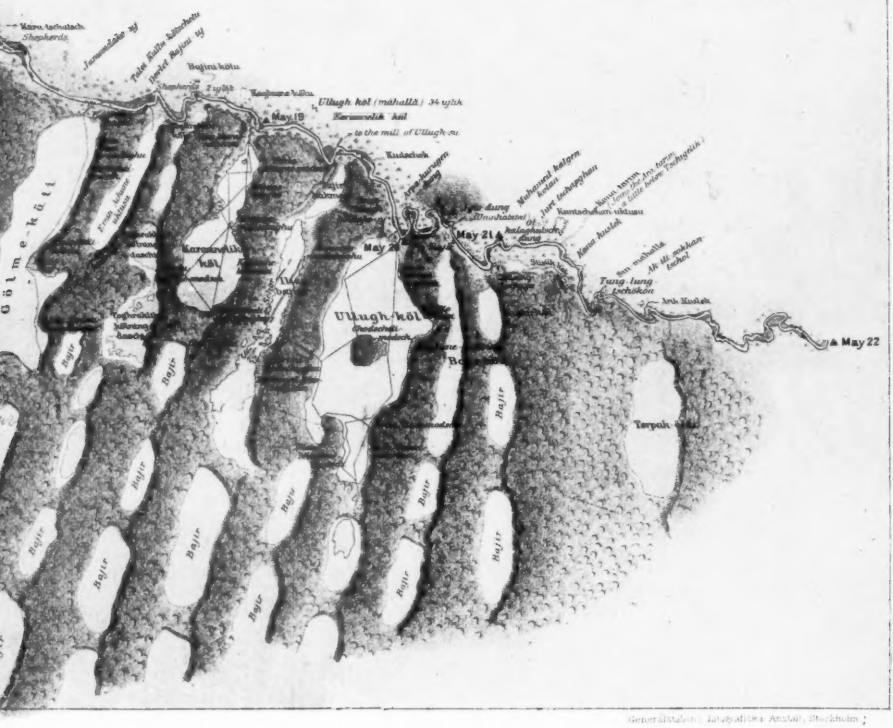

Dr. Sven Hedin's Journey in Central Asia 1899–1902
Jangi kül Head quarter during the winter 1899–1900.
Dec. 7 – May 19
Young scattered forest.
Sejï-köl
Basch-köl
Jangi-köl
Gölme-köl
Bajir
Constr. and drawn by H. Bystrom.

From LAJLIK to JANGI-KÖL and to JURT-TSCHAPGHAN

1899 Dec. 7

1900 May 19–22

Scale 1 : 100000



Generalstabens Litografiska Anstalt, Stockholm.

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The inhabitants of the region described live principally by fishing, only in part by agriculture and hunting. They take their fish almost entirely in lakes artificially made in the depressions along the river banks, and fill these natural depressions by means of canals, 150 to 1,200 saschen long, which were dug by their ancestors. All these lakes have been full of water for many years, with the exception of the Ettek-bair, a lake about 8 versts in circumference, which was only filled in 1886. In the same locality there are counted a dozen such lakes, seven large ones and five small ones. They all lie on the right bank of the river, and their shores are overgrown with tall reeds. The largest lake, Jangi-kul, is about 15 versts long by 2 versts broad, and its depth amounts to 3 saschen. The next largest, Basch-kul, is 12 versts long, 1 verst broad, and 3 saschen deep. The area of the other five large lakes is only about one-half the area of Jangi-kul; while the five small lakes measure each one to three versts in circuit.*

All these lakes are cut off from the river, though each has communication with it by means of its inflow canal, but outflow they have none. All the inflow canals are stopped with earthen dams, and are only opened periodically to let in fresh water from the Jarkent-darja just before the autumn floods. The inflowing currents bring with them into the lakes large quantities of fish; as soon as the river begins to drop, the canals are closed and the fish retained in the lakes. Water is let into the small lakes every second year, and into the large ones every third or fourth, and in some cases every fifth year. In the year when water is not let in, the volume of the lake decreases a little, and its water acquires a slightly brackish flavour, and with each year that the lake remains without a fresh inflow the salinity increases, until in the fifth year it is extremely bitter, and very disagreeable to the taste. Notwithstanding this great salinity, all the species of the fish that exist in the Jarkent-darja—*Nemachilus yarkandensis*, *Aspiorrhynchus Przewalskii*, *Schizostorax Biddulphi*, *Diptychus gymnogaster*—are found in these lakes. The lakes are divided amongst the inhabitants of the adjacent villages, each lake having its recognized owners, apart from whom nobody else has any right to fish there.

Then follows an account of the way in which the fish are caught. This description applies to 1890. Since then many inhabitants have given up fishing for agriculture. In the next few pages we shall see what the country looked like ten years later.

The first lake is the Teis-köl, which differs from its sister lakes in not being immediately surrounded by desert sand. Above this there are said to exist two depressions, Ettek-bajir and Kaltschini-bajiri, though neither contains water. Thus the first real desert lake is the Tus-alghutsch-köl, connected with the river by a canal (dry on 7th December), which winds through the reed-beds and has a hut beside it. This lake is said to be now kept cut off from the river, even at the time of high flood, owing to its mouth having been stopped up with branches, brushwood, and clay. The fish which are imprisoned in it are said to become fatter and to acquire a better flavour after the water has in great part evaporated, and the rest of it thus becomes slightly salt. In the winter the fish are taken in nets let down through holes hewn in the ice, the fish being driven into them by the men stamping and jumping on the frozen surface of the lake. In the summer the fish are caught from canoes. The lake, which is entirely surrounded by high barren sand-dunes, is said to attain a depth of three fathoms (kulatsch—the distance between the finger-tips when the arms are stretched out at full length). Nine families who formerly dwelt on its shores abandoned their huts in 1892 and flitted over to the

* 1 saschen (sagena) = 7 feet. 1 verst = 3,500 feet.

left bank of the Tarim in order to carry on agriculture. The name Tus-alghutsch-köl conveys implicitly an indirect explanation: it means the Lake whence People Fetch Salt. Possibly its shores are saliferous. In area the lake is very small, and on 7th December it was entirely frozen over.

The next lake is the Sejt-köl, connected with the river by three canals (utschu or aghsi), now stopped up. All three canals have forced their way through the sand-dunes, though the immediate banks of the middle one and the lowest are quite flat and overgrown with reeds. The lowest, when open, turns a mill. The northern portion of the lake lies for some distance parallel with the river, and so close to it that the two upper canals are each only a couple of hundred meters long. But, as was well seen from the top of the dunes, not far short of 100 m. high, on the east shore of the Sejt-köl itself, the larger portion of the lake extends S. 27° W., and resembles a fiord penetrating between mountains of sand. A long way off was observed a *bughas* (neck or contraction) between two projecting headlands, and beyond that a fresh expansion terminated towards the south by relatively low sand-dunes.

Strange to say, the natives everywhere asserted that the lakes are "artificially made." According to them, long, long ago canals were dug, and these were widened by the high flood-water, and in this way the depressions, which already existed among the sand-dunes, became gradually filled; and in part the sand was even thrust back by the encroaching water. This simple explanation can, of course, only be partially correct. That the depressions have not been artificially made is perfectly self-evident; they existed, indeed, before the Tarim ever flowed through that part of the country. That they have been filled and are kept filled with water from the Tarim is equally clear, and will shortly be sufficiently proved on the basis of exact measurement. On the other hand, it is not likely that all these connecting channels have been made by human agency; it is more likely that the river, by shifting to the right, and in consequence of its overflowing, has carved paths for itself into the depressions. But of this more later on.

At the foot of the vast accumulation of sand on the east shore of Sejt-köl there is a village of the same name, but its huts, built of poles and reeds towards the end of the seventies, now stand empty and deserted. The twenty-three families who inhabited them flitted, like the twenty-five families of Teis-köl, to Ak-tarma, on the great highway, in 1892. The reason of their changing their

habitation was an outbreak of smallpox (tschätschäk), which raged in this district and decimated the inhabitants. The same visitation having ravaged all the villages alongside these lakes, the survivors were ordered by the Chinese authorities to flit over to the left bank of the river and devote themselves to agriculture, especially the growing of wheat, and to pastoral pursuits, more particularly the breeding of sheep. Previous to that time they had lived almost entirely upon a fish diet and by fishing. The soil does not, however, appear to be very favourable for cultivation, and the harvest does not yield sufficient for the people's needs. This is indeed strange, for one would think that in this locality of all others the irrigation of the fields would not be attended with any special difficulties.

Although a few well-to-do families own as many as 1,000 sheep, most of them possess barely 100 each. As a rule, they have to procure part of their supplies of flour from Korla, purchasing it by the barter of their sheep. The deserted villages are not occupied, even in summer; the people, who are few in number, are still afraid of infection, although they are said to have been vaccinated by the authorities. When the former villagers visit the lakes for the fishing in the summer they prefer to spend their nights in the open air; for fish still continues to form an essential part of their food—indeed, without it they could not exist. The inhabitants of the whole of this region call themselves Loplik—*i.e.*, people from Lop, just as the inhabitants of Kaschgar and Tschertschen call themselves respectively Kaschgarlik and Tschertschenlik. It is precisely in this region that the ancient name of Lop has ineradicably rooted itself.

Generally speaking, the dunes do not advance right up to the shores of the Sejt-köl, but are separated from them by a narrow strip of ground overgrown with reeds and tamarisks, with an occasional poplar. Thus the ground upon which the dunes stand lies somewhat higher than the level of the lake, though, on the other hand, it is to be noted that the lake has been shrinking and its *niveau* falling since its feeding-canals have been closed. Although the depth is said to reach 4 fathoms, it is, as a rule, much less. In the northern part of the lake there are some small sandy islands. The lake was frozen over from end to end, but it was only along the shores that the ice bore. The northeastern shore of Sejt-köl was studded with a great number of small, shallow pools. To ride from one end of the lake to the other took a horseman who was sent there at a later date an hour and a half of hard riding. Be-

yond and in the line of the lake's south-southwest continuation he discovered three depressions, separated from one another by "thresholds" of sand. * * *

For the sake of clearness it is well to gather up the principal results to which the above inquiry has led.

Between Karaul and Basch-arghan there is a chain of lakes, at least 35 in number.

They are fed by the Tarim through connecting channels.

Consequently they possess fresh water, which becomes slightly brackish when their connection with the river is severed, but is, owing to its stationary condition, as clear as crystal.

Their existence proves that the strip of land along the right bank of the Tarim lies at a lower level than the river.

Each lake occupies an independent depression lying between two elongated dunes.

Each of these depressions is deepest in its southeast part, and has a deep trench along the leeward slope of the dune on its eastern shore.

The western and northern parts of each lake are shallow.

The farther down the river the lakes lie, the greater grows their maximum depth, but the less their mean depth.

As a rule, the breadth increases, and the length decreases, the farther the lakes lie down the river. The proportion of length to maximum breadth is 8.0:1 in the Basch-köl and 2.8:1 in the Begelik-köl.

In three lakes that were sufficiently measured, the volume increased the farther the lake lay down the river. This is, however, an apparent law merely, and is simply due to the lakes selected. If we take the mean depth of the Jangi-köl as equal to that of the Karaunelik-köl, its capacity will be 120 million cubic meters.

The sides of each lake-basin are cemented by matter partly of fluvial, partly of æolian origin.

Beyond the inner—that is to say, the south-southwest—end of each lake, there is a bajir or depression exhibiting the same characteristics as the lake-basin itself, except that it contains no water. If there is water, the depression is called daschi, or "salt-pool."

The size of the connecting channels is proportional to that of the lake. Sometimes there are two, and even three canals. The length of the canals which feed the lower lakes appears to be greater than the length of those which feed the upper lakes.

All the lakes receive an inflow of water at the periods of high water, unless their canals are dammed by the natives or the lakes are isolated by a change in the course of the river.

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In their topography the lakes reproduce the contours partly of the adjacent sandy desert, partly of the substratum.

The depressions were originally caused by wind-erosion, and their situation in the trenches of the substratum—*i. e.*, the everywhere predominant direction of their major axis from north-northeast to south-southwest, was originally caused by the prevalent wind blowing more or less at right angles to the main axis of the dunes.

Several of the lakes are contracted and narrow in the middle—a result attributable to the festoon arrangement of the dune-chains.

The lakes are of no great age, because the river itself has not long flowed through that region.

On both sides of each lake, east as well as west, there is generally a narrow strip of vegetation—the former owing its existence to the protection it enjoys against the wind, the latter to the wide berth afforded in consequence of the drift sand having been blown away by the wind, so that it does not smother the vegetation. This vegetation has been brought to these regions, which formerly were absolutely sterile, by the waters of the Tarim.

The lakes are full of fish, and fishing is carried on in several of them, though, since the natives have devoted themselves to agriculture, not to the same extent as formerly.

The highest dune I measured in this region had an altitude of 89.5 m. and the greatest depth sounded amounted to 14.0 m. (at Markat). Thus the greatest vertical difference of elevation is 103.5 m.—in fact, this was the greatest vertical difference of elevation I measured throughout the Lop country. It is, of course, possible there may be an even greater depth locally in one or other of the lakes, and that one or other of the dunes may stand a little higher, but the difference will in no case exceed a couple of meters or so above the 103 m.

As regards the future of these lakes, it may be taken for granted that they are doomed to perish, either through the advance of the dunes or the instability of the river. Their existence is in any case precarious, and represents merely a passing phase in the history of the development of the lower Tarim.

If through any cause they should disappear, it would result in an increase in the extent and volume of the Kara-Koschun. Their enlargement, being a consequence of the raising of the river-bed, has resulted in the diminution of the area of the Kara-koschun during the period in which it has been subject to observation.

THE OPPORTUNITY FOR THE ASSOCIATION OF AMERICAN GEOGRAPHERS.

An Address by W. M. Davis at the First Meeting of the Association in Philadelphia, December 29, 1904.

The segregation of specialists into societies of national membership, but of limited scope, has been a noticeable feature of scientific development among us in the last ten or twenty years. The profitable results are apparent to all who have attended the many successful meetings that the various societies have held; the unprofitable results have been little discussed. While on the whole the latter are not of great importance, they certainly deserve consideration when it is proposed to form yet another society of specialists. The chief of them are: the interference with other interests caused by the multiplication of meetings devoted to single sciences, the narrowing influence of withdrawal from more general discussions, and the cost of yet another annual fee. These considerations have not been overlooked by those who have decided to form an Association of American Geographers; their decision was taken because it was felt that, as far as the above considerations are concerned, much more would be gained than would be lost by establishing such an association. But there are other difficulties attending our particular case. Geography as a subject of mature study has little recognition in this country. Most of those who give their mature years to its cultivation devote their efforts to such of its elements as can be apprehended by young pupils. Most of the other mature students of geography are also occupied with associated sciences, such as geology, biology, or history. Indeed, geography broadens greatly as it matures, and some critics fear that it lacks the coherence essential to a science that is to hold a society together. It is not to be denied that this is a serious embarrassment; yet even when the other difficulties are added thereto, they do not outweigh the advantages that it is hoped and believed may be gained by organization; and it is particularly to the means of reaching these advantages that I wish to devote a few minutes of our first meeting.

In the first place, we may fairly hope, from the success that has already attended the efforts of the Committee on Organization, to bring together a large majority of the investigating geographers of

the United States—indeed, of North America. If we are really successful in thus associating the students of the organic and inorganic sides, the human, economic, zoological, botanical, climatic, oceanographic, and geologic sides of geography, and in leading them to work in view of and in co-operation with each other, and to present their results in each other's presence, we shall have taken an important step in the development of geographical science; for it cannot be doubted that students on the different sides of our subject have as a rule lived too far apart. If we can bring them together, we shall do much towards establishing a higher standard for mature geography, by making a better knowledge of its many sides essential.

While we propose limitation of membership to those who have done original work in some branch of geography, it is not the wish of the organizing committee to make our meetings exclusive, but rather to welcome to them all interested persons, and particularly those who by further work hope to take membership with us. The encouragement that we may give to these younger students to persevere in the cultivation of truly geographical science will, I trust, not be the least useful duty of our Association.

In both of these efforts we wish to occupy as truly a national position as any of the other national scientific societies—such as the Geological Society of America, or the American Physical Society. We shall have no fixed home; no limitations as to residence of members or officers, or as to place or time of meetings. At the same time we wish to establish the most cordial relations with all American geographical societies. We shall respect the pronounced individuality of the existing societies and promote the developing initiative of new ones. We shall hope to gain close acquaintance with them, not only by inviting their more active investigators to take membership in our Association, but also by asking their hospitality from time to time in allowing us to meet in their rooms. We do not propose to enter into competition with the existing societies in the way of publication. Most naturally, therefore, we wish geographical societies to increase in number and strength all over the country. While our membership must remain comparatively small—we may not reach a hundred for some time to come—nothing will give us more satisfaction than to see the more popular membership in the general geographical societies roll up to many thousands.

Our activities will not be limited to meetings for reading papers indoors. We hope not only to hold field meetings in the open

season, but also to do our utmost in promoting geographical investigation and geographical progress of all kinds. There is plenty of work to be done. It goes without saying, however, that members and officers alike will have to give time and thought and effort if significant results of these kinds are to be reached. In my own judgment, our success will be measured chiefly by the amount of geographical activity that comes to be associated with our meetings. The reading of papers is one indication of such activity; but it is not the only one, and perhaps not the most important one.

In the midst of great diversity of interests, and of active competition with societies in other subjects, there are, on the one hand, evident difficulties before us. We hope, on the other hand, to bring prominently forward the geographical element in all our work here presented, in order to strengthen the bond that draws us together; and we must, if possible, arrange the time and place of our meetings so that the other interests of many of our members shall not suffer. The Council of the Association will ask the best suggestions of all members toward these ends.

We have one great encouragement. A year ago we were only an imaginary quantity. Now we have taken form; we have already an enviable list of members, a good programme for our first meeting, and a representative, if not a large attendance. A great opportunity for useful work is before us; we have only to press forward to reach it. Let us press forward together!

CIRQUES: A REVIEW.

BY

ROBERT MARSHALL BROWN.

Description: Cirques have been described as crescent-shaped hollows or half-cauldrons on the sides of mountains (Geikie, A., 1887, 157), as large spaces excavated from the solid rock, bounded on three sides by an almost cylindrical steep mountain wall, and with a tolerably flat floor (Helland, 1877, 161); armchair-like recesses in mountain sides (Richter, 1900, 103).

The essentials are the steep sloping sides, the embayment in a mountain slope, the exit facing the valley, with a sill generally above the level of the floor of the cirque, and the sharply-cut remnants of mountains where cirques have been numerous, shading to the more normal form of mountains in unglaciated regions where this feature has been less common. The variations of cirques

depend on the differences of rock structure as well as the accidents of the agents of modelling. The shape and size depend upon the resistancy of the rock. Every rock has its own peculiar type. Weathering may have softened the rugged outline, if the time since the last vestige of ice was melted has been sufficient. The sill may be of rock, a remnant of a less efficient erosion, or of morainal matter. The basin itself may contain a lake, if time has not been long enough to allow a complete breaching of the sill. Talus, from the cliff walls, tends to fill up the basin, and aids in its way in obliterating the lake or tarn.

Name: Custom has not yet made a decision as to the universal name of this feature of mountain sculpture. Many countries furnish their own local names, and the word has been parenthetically translated into three or four languages, when the form is mentioned —thus, corries (Cirques, Karen, Botner). In the Scottish Highlands, corry is the prevailing word; in Wales, cwm; in Norway, botn; in the Alps, kar; while the French-Swiss supply the name cirque. Cliffed amphitheatre is less commonly applied to the true cirque type. This last name is reserved for a similar form of a somewhat different origin.

Localities: Cirques have been described from nearly all mountainous countries. Those of Scotland, Norway, and the Alps have quite monopolized the attention of geologists, mainly because of their prominence, numbers, and accessibility. The Pyrenees offer good examples. The Balkan Peninsula, the Himalayas, Greenland, and our own Western mountains furnish a number of features.

Theories: A theory of the origin of cirques was early published (Forbes, 259), in which they were described as craters of upheaval. The diversity and character of the rocks in which they occur did not allow this theory to gain strength.

Bonney (1871, 320) considered them pre-glacial, and treated them as the result of streams falling over cliffs. He demanded certain favourable conditions of the ground; upland glens so shaped as to give rise to and maintain many small streams; moderately horizontal strata; strata of such a nature as will allow of the formation of cliffs, the most favourable being thick beds of limestones, with alternating bands of other rock.

A little later cirques were described in the Alps and in the Himalayas. In the latter the ice still occupied them (Drew, 1873, 399). The floor was filled with ice, and the steep sides were covered with accumulations of snow. In the Alps, Gastaldi (1873, 396) was convinced that the cirques were formerly occupied by

glaciers but little anterior to the modern period, and that the ice was well able to excavate for them deep beds in all kinds of rock.

In 1877, Helland (1877, 161), after an extensive study of the cirques of Norway, Scotland, and Greenland, stated that they were connected with glacial invasions. Furthermore, he considered that their position had some relation to the line of perpetual snow. As in Norway, cirques were found to be numerous in regions of small isolated glaciers; and as the limit of the snow is most favourable for the formation of such glaciers, the relation is a consistent one. While Helland placed the line of perpetual snow as a prominent seat of corry construction, he fairly stated that, inasmuch as it is in accord with glacial laws that glaciers flow much below the snow limit, so cirques will exist below; and, on the other hand, retreating ice will place cirques at higher levels.

A. Geikie (1887, 165) deemed that the formation of cirques was due to torrential streams, converging towards a mountain chasm. Frost was considered a powerful factor in the process, while snow and glacier ice was admitted as a not less powerful source of aid in the work.

J. Geikie (1895, 236) made a distinction between cirques of non-glacial origin and those of glacial origin. While many valleys headed in cirques before the ice invasion and in countries with no glacial record cirques appeared, they did not, however, exhibit the basin-like bottom nor cliff wall which characterizes cirques of glacial origin. He considered that many of the glacial cirques were born of non-glacial cirques. These non-glacial amphitheatres served as channels, and the ice, concentrating its erosion, scoured out a basin.

Johnson (1899, 112) explains the recession of the cirque walls by a process which he calls sapping. A glacier scours its valley downwards and outwards because of the direction of ice advance and the weight of the mass. The sapping process, on the other hand, is backward and horizontal. Where crevasses which extend to the base occur in a glacier, the rock is exposed to excessive weathering by frost agencies. The greater part of this action is probably the result of a diurnal change of temperature during certain seasons of the year. There is then a disrupting of the rocky base, a new position of crevasses posterior to the first location, and a gradual recession of the cliff walls as the process repeats itself. The glacier makes the cirque, in the first place, by this process, and then, by continual occupancy, enlarges it. The final result of the erosive action is to subdue the mountain.

Matthes (1899–1900, 173) considers a cirque as a modified pre-glacial stream-worn valley whose V-shaped cross section has been converted into a wider U-shaped one, and whose grade has been flattened rather than lowered. In order to have a typical cirque, he insists that the pre-glacial valleys must be far enough apart, so that the recession will not cause a coalescence of such valleys, that there must be no subsequent sculpturing by remnant glaciers on the crests of the mountains, that the rock be homogeneous, and that there be no post-glacial remodelling by weathering or erosion. Matthes agrees with Johnson so far as to state that the cirque is essentially the product of a crevasse, and that if it were not for the opening which allows the outside air to reach the foot of the cirque wall the latter would have no tendency to recede, and therefore, no cirque would be formed.

De Martonne (1901, 10) considered that cirques are as evident indications of glacial action as roches moutonnées and striæ.

Davis (1901, 305) connected the formation of cirques with local glaciers—the dwindling tributaries of the greater glacial streams. The sill and the basin floor are not consistent with an actively-flowing stream. While the greater part of the work of deepening and widening a cirque may be done during the tributary stage of a glacial head stream, the final touch must depend on the remnant of the stream left in the cirque. The length of time during which this local stream works will determine the completeness of the basin. That the cirque should possess a sill and a rock basin is the result of differential work of the local glacier. At the terminus of the ice stream, the disappearing ice will do little work. Back from the melting front, erosive power must increase for a time because the thickness of the ice increases. The maximum point is soon reached, and a decrease begins as one passes towards the névé fields. This position of maximum erosive power in a glacier limited to a cirque is sufficient, in time, to yield the basin. When the local glacier was a part of the larger stream—taking the condition of the cirque glacier as the remnant of a more extensive flow—the maximum would be located in respect to the entire stream, and no basin would be possible in the head branches unless resistant rocks were encountered.

River Amphitheatres and Cirques: River amphitheatres are formed as in the Colorado River, where the head waters come in in all directions, and where the action of the water on the rocks is equal on all sides. In glacial-formed cirques, the retreat of the ice over the sill has worn the bottom of the basin deeper than the outlet,

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and abandoned cirques often hold lakes. River amphitheatres, on the other hand, must always be open to drainage, inasmuch as they are stream-made. In rivers, if the head of drainage is not reached, no amphitheatre will be formed; but the river will cut back, forming a cañon narrowing upwards towards the source. The conditions necessary for the formation of a river amphitheatre are numerous and fairly exact, so that such features in rivers are uncommon. Bonney's conditions of cirque-formation, above mentioned, might well find a place here. Cirques are too common a feature of mountains, and too independent of rock structure, to have been reared under such limitations.

The term valley cirque has been applied to the long glen into which the cirque proper opens. They are the result of the erosion of the trunk stream, and generally show features similar to those of the mountain basin. They represent the work of the ice previous to the more local habitations in the mountain sides.

Special Features: The interior of a cirque shows a breaking of the rock, not the smooth wearing that would be expected. The rather jagged interior suggests strong action, and is very likely associated with the temperature, which must hover about the freezing-point. The melting of the ice filling the cracks of the rock with water and a subsequent freezing would account for this. Simple water action alone could not produce such a form. In a retreating glacier occupying a cirque the alternating melting and freezing must be diurnal for a considerable season.

The outlines of most of the highest mountains are due to cirques. Richter (1900, 103) goes so far as to say that the Alps would show the rounded form of subdued mountains to-day if they had not been invaded by ice. The steep cliff-like walls of neighbouring cirques meeting in a sharp edge often yield arêtes or fish-back ridges. Three cirques coming together form a drei-kanter, as in the Matterhorn. The rounded form of Mont Blanc seems to have been singularly free from such invasion. Much of the Alpine region shows the sharply-serrate forms. This may be applied with almost equal force to Big Horn Mountains, to Norway, to Scotland, and, in fact, to all glaciated mountainous regions. It has been pointed out, moreover, that as in the Alps passing from west to east cirques occur at higher and higher levels, we may use this as evidence that the snow-line of glacial times gradually rose to higher levels as it passed from west to east into the interior.

An interesting case of glacial capture is instanced by Matthes (1900, 167–190). In the Big Horn Mountains two cirques are so

situated that one seems to overlap the other. The present drainage from one turns sharply and passes through the other. The slope of the latter is steeper than the slope of the former, and the suggestion arises that the latter encroached upon the field of the former and effected a capture of its drainage.

LITERATURE.

Bonney, 1871.—On the formation of cirques and their bearing upon theories attributing the excavation of Alpine valleys mainly to the action of ice.—(*Quart. Journ. Geol. Soc.*, XXVII, 1871, 312–324.)

Davis, 1901.—Glacial erosion in France, Switzerland and Norway.—(*Proc. Bos. Soc. Nat. Hist.*, 29, 273–322.)

Drew, 1873.—Glacial erosion.—(*Quart. Journ. Geol. Soc.*, XXIX, 399.)

Forbes.—Norway and its glaciers, 259.

Gastaldi, 1873.—On the effect of glacial erosion in Alpine valleys.—(*Quart. Journ. Geol. Soc.*, XXIX, 396–399.)

Geikie, A., 1887.—Scenery of Scotland, 2d ed., pp. 157, 165.

Geikie, J., 1895.—The Great Ice Age, 3rd ed., pp. 236–237, 251, 520, 574, 588, 595.

Helland Amund, 1877.—On the ice-fiords of North Greenland and on the formation of fiords, lakes and cirques in Norway and Greenland.—(*Quart. Journ. Geol. Soc.*, XXXIII, 161 et seq.)

Johnson, W. D., 1899.—Work of glaciers in high mountains.—(Science, N. S., IX, 112.)

Matthes, 1900.—Glacial Sculpture of Big Horn Mountains. (21 Ann. Rep. U. S. G. S., Pt. II, 167–190.)

De Martonne, 1901.—Sur la Formation des Cirques.—(Ann. de Géogr., X, 1901, 10–16.)

Richter, E., 1900.—Geomorphologische Untersuchungen in den Hoch Alpen.—(Pet. Mitt. Erg'heft, 132, 103.)

WORCESTER, MASS.

A RÉSUMÉ OF THE GEOGRAPHICAL DISTRIBUTION OF THE DISCOGLOSSOID TOADS IN THE LIGHT OF ANCIENT LAND CONNECTIONS.*

BY

LEONHARD STEJNEGER,

of the United States National Museum.

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The discoglossoid toads form a small, compact group of five recent genera remarkable for their primitive structure and for their extraordinarily disconnected distribution. One genus, *Liopelma*, is the only batrachian found in New Zealand. Another genus,

* A paper read before the Association of American Geographers in Philadelphia, December 29, 1904.

Ascaphus, is only known from a single specimen obtained a few years ago in the State of Washington not far from the Pacific Coast. The three other genera are inhabitants of the Old World: *Discoglossus*, with one recent species occurring in western North Africa, the western Mediterranean islands and the Pyrenean peninsula; *Alytes*, the celebrated midwife-toad, with two species, one of which is confined to the latter peninsula, while the other extends also through France and western Germany; finally *Bombina*, the bell-toad, with three species, one occupying the Balkan peninsula, the Italian peninsula, and the adjacent mountain regions of Central Europe, extending westward into France, though without reaching Bretagne or the Pyrenees, the other occupying the lowlands to the east and north into Russia, while the third is located thousands of miles away on the opposite side of the Eurasian continent—viz., in north-eastern China, Korea, and the Ussuri country.

This unique and disconnected distribution points to a great antiquity of these animals, and promises to shed some light upon the problem of ancient land connections, as the batrachians, more than any other class of vertebrates, require continuous land for their dispersal.

All indications point towards the country southwest of the Himalayas as the original centre of the radiation of the discoglossoid toads, as well as of their near relations the pelodytoid toads. The former are not now found in this region; but that fact weighs but little in view of *Ascaphus* having remained unknown on this continent till 1899, and thus far known only from a single specimen. The absence of paleontologic evidence is also insignificant when it is remembered that only unidentifiable fragments of toad-like animals have been found on this continent from Jurassic and Tertiary deposits.

The significant fact is the occurrence of *Liopelma* in New Zealand; and as the latter archipelago has not been connected with the great continental landmarks since the end of the Cretaceous, that batrachian must have reached those Antipodal islands before that time. The connection with the Sino-Australian continent must have been an eastern one, as various facts militate against Australia proper having been involved.

There is, then, no difficulty in assuming that the ancestor of the North American *Ascaphus* reached the Pacific Coast of North America during the Upper Cretaceous over the landbridge which must then have connected eastern Asia and the western portion of our continent—a bridge the existence of which is attested by so

many facts, and now so universally admitted that it does not detain us here.

The discoglossoids must also have reached Europe shortly after, as we find them recorded (*Discoglossus troschelii*) already in the European Lower Miocene, and it is even possible that they may have been there as early as the Upper Eocene.

If the geologists are right, who insist on the existence of a vast Mediterranean Ocean in the Lower Tertiary separating absolutely Europe from Eastern Asia, none of these early discoglossoids can have reached Western Europe from the East. A direct land connection with North America at that period meets with less difficulty and seems altogether probable. In that case the ancestors of *Discoglossus* and *Alytes* may with certainty be regarded as having come to Europe from America, in favour of which contention their Western distribution may also be cited.

The case of *Bombina* is less easily disposed of, due to the occurrence of one species at the extreme eastern end of Asia separated by thousands of miles from the other two. Of the various theories which might be advanced in order to explain this distribution it seems most reasonable at present to select the one which presupposes a comparatively late immigration of this genus from south-eastern Asia into Europe after a late Miocene land connection had been established—a theory which would account for the failure of these toads to reach Spain on the one side and Japan on the other. This assumption rests upon the negative fact that *Bombina* has not been found fossil in Europe below the Upper Miocene. Should it be found lower, we will have to assume for it an American route, or else that the separation of Europe from Eastern Asia by the Mediterranean Ocean was not so complete or of so long duration as has been generally asserted.

The main significance of the above review is that it shows the discoglossoid toads to conform in all essential points to the ancient land connections sketched so admirably by Dr. Ortmann about two years ago, in his paper on the geographical distribution of the decapod crustaceans. The distribution of these toads—at first sight so extraordinary and puzzling—becomes easy of explanation if the distribution of land and water in time and space has been as suggested to him by the range of the decapods.

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SECOND ANTARCTIC VOYAGE OF THE "SCOTIA."

A very interesting account of the second year's work of the Scottish National Antarctic Expedition appears in the *Scottish Geographical Magazine* (Jan., 1905). It will be remembered that at the close of its first year's work the *Scotia* went to Buenos Aires for supplies. On January 21, 1904, the vessel left Buenos Aires for the south on her second journey to Weddell Sea. Besides her own staff, there were on board three Argentine meteorologists sent out by the Argentine Government to man the observatory in Scotia Bay, South Orkneys. These islands were reached on February 14, the Argentine party was left under the leadership of Mr. R. C. Mossman, and on February 22 the *Scotia* started for Weddell Sea.

A southeasterly course was steered to cut between the *Scotia's* two tracks of the previous year. No ice was met till near the Antarctic Circle. Early in March the *Scotia* surpassed her southern record of 1903, and also Ross's farthest south of 1843. No obstacle had been met, though in the previous year impenetrable pack was found in this region.

In 72° 18′ S., 17° 59′ W., a sounding of 1,131 fathoms was obtained. All the depths up to this time have been over 2,600 fathoms. At the same time land was reported ahead. A lofty ice barrier stretching northeast and southwest barred further progress to the south. Close, heavy pack prevented a nearer approach than two miles. This barrier was traced 150 miles to the southwest. In 73° 30′ S., 21° 30′ W., a depth of 159 fathoms was found, the ice barrier being then two and a half miles off. Early on the morning of March 7 the *Scotia* was caught in a northeast blizzard and beset in slush and heavy pack. At the end of two days the gale abated and the party found that the *Scotia* had been driven into a bight of the ice barrier. This was in 74° 1′ S., 22° 0′ W., and the depth here was 161 fathoms two miles from the barrier. The Expedition believed the *Scotia* might be frozen in for the season, and began to make preparations for winter. Emperor penguins were extraordinarily abundant, and many were secured for specimens, as well as for food, in case the party had to winter there. Skuas, terns, Antarctic and snowy petrels were also very abundant, and some seals were seen.

Fortunately, the pack began to break up on March 13, and soon

the *Scotia* was once more afloat and started north. The part of the Antarctic continent which the Expedition had discovered was named "Coats Land" after Mr. James Coats, Jr., and Major Andrew Coats, the two chief subscribers to the Expedition. Concerning this new land Mr. Bruce, the leader of the Expedition, says:

> I have been asked by several if I am sure that this great ice barrier was really part of the Antarctic Continent. I have no hesitation in saying "Yes," and my reasons are these: All our soundings between 60° and 70° S. were 2,500 to 2,700 fathoms. In 72° S. they shoaled to about 2,300 fathoms, fifty miles from the barrier. Thirty-five miles from the barrier they shoaled to 1,400 and 1,200 fathoms, and two miles from the barrier to 160 fathoms. This alone should answer the question in the way which I have done. Secondly, from the vertical cliff of ice 100 to 150 feet in height which bordered the ocean the ice rose high inland in undulating slopes and faded away in height and distance into the sky. It was impossible to estimate the height of this field of ice—the true inland ice of Antarctica—but probably it was many thousands of feet. Thirdly, seals and birds, which up till now had been few in numbers, were seen in myriads—penguins, especially emperors, many petrels, and terns swarming in every direction—the inhabitants of the beaches and rocky cliffs of some actual land not very far distant.

It was now the end of the Antarctic summer, and the *Scotia*, therefore, turned northeast towards the "Ross Deep." The water deepened rapidly to over 2,000 fathoms, until after a few days, when a somewhat more easterly course was taken, which brought the vessel into rapidly-shoaling water. In 71° 32′ S., 17° 15′ W., the depth was 1,221 fathoms, which showed that the Expedition was getting to the continental shelf of Antarctica again. As pack was here met, the *Scotia* turned back to the northeast. Trawling in 1,410 fathoms in this region resulted in one of the richest hauls the party had made in Antarctic waters, no less than sixty species of animals being obtained.

On March 23 a sounding of 2,660 fathoms was obtained within one mile of Ross's reported sounding of "4,000 fathoms, no bottom"; so after 60 years this sounding, and with it the hypothetical contours of the South Atlantic based on it, have been obliterated from the map. This implies no disparagement of Ross's splendid work. His error was doubtless due to inadequate sounding apparatus and to a strong undercurrent which the *Scotia* discovered in this region.

Steaming nearly due north up to Gough Island, the expedition discovered comparatively shallow water, under 2,000 fathoms, north of 52° S. This shows an extension of the Mid-Atlantic Ridge to the south of the Tristan Da Cunha group. From 58° S. to 48° the bottom was diatom ooze and hard ground; in 46° and 41° S. samples of globigerina ooze were brought up.

The party landed on Gough Island, and found it clothed in green. Tussock grass and a small stunted tree (*Phylica nitida*) grew in abundance, with ferns and mosses. The fauna and flora

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resemble those of Tristan Da Cunha, but probably include several new species; two species of birds new to science found here are now being described. Ruins of huts were on the island, and it was afterwards learned at Cape Town that sealers had spent some months here. The *Scotia* reached Cape Town on May 5th.

The chief scientific results of the *Scotia's* voyage may be briefly summed up. Soundings and the discovery of a southern limit to the sea at Coats Land show that the Weddell Sea is less extensive both in area and depth than had been supposed. Temperature and salinity observations of the water were taken at all depths, samples of the bottom deposits were obtained, and the zoological collections embrace many birds, in addition to seals, fish, and representatives of almost every class of invertebrates, from the surface waters, from intermediate depths, and from the bottom of the ocean. Systematic plankton collections were also made.

At the South Orkneys materials were collected for a detailed map of Laurie Island, which will be published soon; an hourly meteorological record was kept for eleven months, and the record is being continued by the meteorologists stationed there; and, in addition, similar observations were taken by the *Scotia* all the time she was at sea. Magnetic observations were made, the botany and geology were investigated, and an extremely rich shallow water fauna was collected, in addition to many specimens of the seals and of the birds of the locality, with their eggs.

In the South Atlantic a somewhat deeper channel has been found between Falkland Islands and the South Orkneys than was previously supposed to exist. Farther east the ocean's contours were materially changed by the discovery of a large southern extension of the Mid-Atlantic ridge to the south of Gough Island. Physical and biological work was carried out in a hitherto entirely uninvestigated ocean; and on Gough Island a small but representative collection of the fauna, flora, and geology was made for the first time.

The report refers to the large amount of work yet to be done between the Tristan Da Cunha group and South Georgia, of island groups still unexplored, and of additional discoveries to be made of other parts of the Antarctic continent in the Weddell Sea region. The hope is expressed that the work begun by Mr. Bruce will be continued in the near future.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

TRANSACTIONS OF THE SOCIETY, JANUARY, 1905.—The Annual Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, January 24, at 8.30 o'clock P.M.

President Peary in the chair.

The following persons, recommended by the Council, were elected Fellows:

J. Parke Channing.
Henry Parish, Jr.
Arthur E. Stillwell.
George Crile, M.D.
Dr. Titus Munson Coan.
James Morris.
James Jesse Atkinson.
William S. Day.
Joseph Peabody.
Abram S. Post.
Edward L. Rogers.
Clifford S. Griswold.
Charles M. Schott, Jr.
James Mills Peirce.
Samuel Sachs.
Gardiner Sherman.
C. Stuart Gager.
Dr. Richard B. Coutant.
August R. Meyer.
Richard T. Dana.
M. J. Butler.
Mrs. John Wells.
John Byron Goldsborough.
Robert E. Plumb.
Franklin R. Carpenter.
Ralph G. Packard, Jr.
George St. John Sheffield.
Dr. Warren O. Plimpton.
Mrs. John D. Hewletts.
Joshua T. Jones.
Mrs. Bashford Dean.

The Annual Report of the Council was then submitted and read.

NEW YORK, Jan'y 12, 1905.

To the American Geographical Society:

The Council respectfully submit the following report for the year 1904:

The number of Fellows on the 1st of January was 1,240. The additions during the year were 108. The losses by death, resignation, etc., were 83, and the total Fellowship on the 31st of December was 1,265, of which number 364 were Life Fellows.

The additions to the Library number 4,293—Periodicals and Pamphlets, 2,944; Books, 742; Maps and Charts, 526; Atlases, 25; Photographs and Prints, 56.

Six regular Meetings of the Society were held:

On the 19th of January Mr. Robert Lansing addressed the Society on the Questions Settled by the Award of the Alaskan Boundary Tribunal;

On the 23d of February the Rev. Putnam Cady delivered an address on the Physical and Historical Geography of the Dead Sea Region;

On the 15th of March Prof. Wm. M. Davis described his Journey in Turkestan;

On the 19th of April Dr. Edmund O. Hovey told the incidents of a Journey in Southern Russia and the Caucasus Mountains;

On the 22d of November Mr. Oscar T. Crosby addressed the Society on a Journey in Turkestan and a Corner of Tibet;

On the 20th of December Mr. Alfred H. Brooks described the Geography and Resources of Alaska.

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There have been published in the BULLETIN, besides the Record and the Scientific Notes, twenty-four original papers.

For the condition of the finances reference is respectfully made to the report of the Treasurer, herewith presented.

As indicated in the last Annual Report, the Society acceded to the request of the Managers of the Eighth International Geographic Congress to conduct meetings in New York on the 13th, 14th and 15th of September.

All the foreign representatives were the guests of the Society, which provided their transportation from Washington and their hotel accommodation in New York.

During the three days the Society's house was thrown open to the members of the Congress, and all the General Sessions were held in our Assembly Hall; but the house being too small to afford space for many simultaneous meetings, appeal was made to the American Museum of Natural History, which, with great generosity, not only offered the use of several rooms for the reading of papers, for reporters, smoking, etc., but invited all the members of the Congress to a luncheon on the 14th of September.

On the evening of September 13 a reception was held in the Society's house, and on the 14th the Society gave a dinner complimentary to the foreign guests at the Hotel Endicott. At the dinner M. Cordier delivered to President Peary the gold medal awarded to him by the Société de Géographie, of Paris.

At the request of the Society an exhibition of rare maps, admirably arranged in chronological order, was freely opened to the Congress by the authorities of the Lenox Library.

The 15th of September was devoted to an excursion on the Hudson River as far as Fishkill, organized and conducted by the Society for the Fellows and the members of the Congress. On the return from Fishkill the party stopped at West Point to accept the hospitality of Brig.-Gen. Mills, Superintendent of the U. S. Military Academy.

The funds of the Society were not drawn upon for the entertainment of the Congress. All expenses growing out of the meetings in New York were paid by voluntary contributions from members of the Council and Fellows of the Society.

In commemoration of the fiftieth anniversary of the incorporation of the Society, a dinner was given at Delmonico's restaurant on the 21st of December.

All of which is respectfully submitted.

HENRY PARISH,
Chairman.

LEVI HOLBROOK,
Secretary.

The report of the Treasurer was then read:

Report of the Treasurer to the American Geographical Society for the year 1904:

GENERAL ACCOUNT:

The Treasurer respectfully reports:

On January 1st there was on hand a cash balance of		$64.58
During the year there have been received for Fellowship Dues, Sales of Publications, Interest on Investments, etc.	$20,238.25	
Mortgage Investment paid off	500.00	
Legacies	3,165.33	23,903.58
		$23,968.16

There have been expended for Salaries, Meetings, Library, Publications, House Expenses, Insurance, Postage, Furniture, etc., etc. $21,367.45

On December 31st there was on hand a cash balance of..... $2,600.71

Respectfully submitted,
WALTER R. T. JONES,
Treasurer.

The Committee charged with the duty of selecting candidates for the offices to be filled made the following report:

NEW YORK, December 8th, 1904.

To the Council of the American Geographical Society:

The Committee appointed to recommend to the Society suitable persons to be elected in January, 1905, to fill vacancies then existing in its offices, respectfully report that they recommend the election of the following-named persons to the offices below designated:

President—ROBERT E. PEARY (Term to expire in 1906).
Vice-President—C. C. TIFFANY (Term to expire in 1908).
Treasurer—WALTER R. T. JONES (Term to expire in 1906).
Domestic Corresponding Secretary } CHANDLER ROBBINS (Term to expire in 1908).
Councillors—GEORGE S. BOWDOIN, CHARLES S. FAIRCHILD, HENRY HOLT, ARCHIBALD D. RUSSELL, HERMAN C. VON POST, } (Terms to expire in 1908).

HENRY PARISH, LEVI HOLBROOK, F. M. BACON, } *Committee.*

The above report was read to the Council and approved, and the persons named are recommended to the Society for election.

On motion, duly seconded, Mr. A. A. Raven was authorised to cast the vote of the Society for the persons named, and they were declared duly elected.

President Peary then addressed the Society on the Geographical Work of the World in 1904. Stereopticon views were shown.

On motion, the Society adjourned.

Mr. H. L. Bridgman, who left New York at the end of December, 1904, on a mission to the Congo Free State, writes to President Peary from the Grand Hotel, Khartum, on the 13th of January, as follows:

The Congo "special" arrived on time this morning, and having hired "boys" and donkeys and purchased outfit, is now ready to leave Sunday afternoon for Lado, 1050 miles by steamer up the Nile, where its real work will begin Jan. 28. I am taking supplies for 56 days, though I shall hope to do the actual marching in less time. I'll try to send back a line from Lado; after that I shall, of course, keep ahead of any letters. . .

AMERICA.

IRRIGATION IN THE UNITED STATES IN 1902.—*Bulletin* 16 of the Census Bureau is devoted to this subject. It describes the wonderful transformation in the past twenty years in many parts of the arid West, where thousands of miles of canals

carry water to more than 8,000,000 acres. This land, at one time a worthless desert, is now annually producing crops worth $100,000,000. A crop-producing area larger than the combined area of Massachusetts and Connecticut has been developed in this once forbidding region. The following facts, showing conditions in 1902, are condensed from Table 1:

	NUMBER OF FARMS IRRIGATED.	NUMBER OF ACRES IRRIGATED.	COST OF SYSTEMS.
Arid States and Territories	122,156	8,471,641	$77,430,212
Semi-arid States and Territories	7,021	403,449	5,105,390
Rice States	4,179	606,199	10,195,992
Humid States	680	5,788	588,858
United States	134,036	9,487,077	$93,320,452

The average cost per irrigated acre was: arid States and Territories, $9.14; semi-arid States and Territories, $12.65; rice States, $16.82; humid States, $101.74; United States, $9.84.

THE SUBMARINE GREAT CAÑON OF THE HUDSON RIVER.—The paper on this subject, which Dr. J. W. Spencer of Washington read before the American Association for the Advancement of Science in Philadelphia, is printed in the *American Journal of Science* (Jan., 1905). Prof. J. D. Dana was the first to recognize, more than forty years ago, the depression extending from near New York to the border of the Continental shelf which the Coast Survey had brought to light as the submerged channel of the Hudson River, formed when the continent stood at a greater altitude above the sea than it does now. The channel begins about ten miles off Sandy Hook, and extends for 93 statute miles before it plunges into the Cañon. Dr. Spencer describes his investigations and studies and those of Lindenkohl, Upham and others, and presents the following summary of his paper and his conclusion:

In 1885, Prof. A. Lindenkohl discovered the channel suddenly transformed into a canyon near the continental border, reaching to a depth of 2,400 feet below the surface of the submerged plain, which is about 400 feet beneath sea-level. But near the then known mouth there appeared a great bar. In 1897, I pointed out that the channel was traceable to great depths, which is now proved. A sounding was made near the supposed bar, which has proved to be only a measurement, taken on the side of a deep canyon with a precipitous wall. Then, four miles beyond this point, against another lateral bank, a further sounding reaches to 4,800 feet, revealing a canyon 3,800 feet in depth, where the continental shelf is not submerged more than 1,000 feet. High up on the sides, the gorge here is less than two miles wide; but the incision of the outer canyon into the shelf has a breadth of four miles. At its head, the canyon begins in an amphitheatre, having a descent from 330 feet to 1,100 feet in the distance of about a mile. Two more steps of 400 and 500 feet respectively follow. Again, between 27 and 31 miles below its head, there is another great step of 2,000 feet to the depth of 4,800 feet mentioned. And the gradient below is probably by other great steps.

This is just beyond the border of the submarine plain, and shows the canyon with a depth of 3,800 feet. The canyon is double, a second or more sinuous gorge traverses the other. A little farther on is a tributary heading in a cove. At 42 miles the canyon begins to widen into a valley, which at 48 miles has a precipitous wall of 2,000 feet in height. The valley opens into an embayment, or wider valley, which also receives that from the Connecticut, now discovered to a depth of about 6,000 feet for the first time, but without details to describe its form. In cutting through the continental bench, at 3,000–3,500 feet beneath the sea-level, the floor of the canyon is between 6,000 and 7,000 feet below the surface of the ocean. The valley is continuous to a point 71 miles from the head of the gorge, and where it is recognizable at a depth of about 9,000 feet.

The canyon and valley discovered to the depth shown, incising first the level continental shelf (in which it turns twice at right angles), and then coursing down the great continental slope, is now taken as a gauge for measuring a late high continental elevation of the region to the extent of 9,000 feet.

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This is following out the lines of Dana, Lindenkohl and other students of the submarine channel, in that they considered it a drowned land valley. I have analysed every other known possible cause of its origin. So great are the probabilities, and so long have these been accepted unquestioned, that very strong proof would be required to modify this view.

The period of the great elevation has been found to coincide with that of the early Pleistocene. Since then there has been a subsidence to somewhat below the present level, followed by a re-elevation of 250 feet as seen in the shallow channels of the shelf. With other minor changes, the region is now sinking at the rate of two feet a century.

This canyon feature at our door corroborates the great changes of level worked out most extensively by Hull of Britain, Nansen of Norway, and myself here and in the West Indies, following methods which the father of geography, Prof. J. P. Lesley, predicted in 1888 "must throw light on the whole subject of elevation and subsidence, as applicable to the entire area of the United States."

PRACTICAL GEOGRAPHY IN AMERICA.—At a meeting of the Geographical Association in England on Jan. 6, a discussion occurred on the teaching of practical geography in schools. Professor Charles R. Dryer, of the State Normal College, Terre Haute, Ind., opening the debate, said that practical geography meant in America laboratory work. This work is not necessarily done in a special room, and, indeed, the best part of it is done out of doors. The study of maps plays a large part in this laboratory work. Contoured topographical maps are also much used, together with raised models illustrating different forms of the earth's surface. Pictures, photographs, and lantern-slides also have a conspicuous place in the school's equipment. The instrumental study of the earth's atmosphere is taken next by the students, who keep records of their own observations for a period of three months. The official weather charts may be obtained daily at every school, and owing to the area covered by them it is possible to follow cyclonic and anti-cyclonic disturbances for several days together, and sometimes to predict in the school itself the arrival at a particular time of an atmospheric disturbance. Field excursions are regarded as the most important part of geographical study.

FINGER LAKE REGION OF WESTERN NEW YORK.—The westernmost members of the Finger Lakes—Canandaigua, Honeoye, Canadia, Hemlock, and Conesus—are described in a recent paper by Prof. Charles R. Dryer (Bull. Geol. Soc. Amer., Vol. XV, 1904, pp. 449–460). He shows that, like the more eastern members, Seneca, Cayuga, etc., these lakes are in long, narrow, deep and smooth-sided valleys. Some of the tributaries to these lake valleys are in valleys whose bottoms are hanging well above not only the lake bottoms, but even above the lake surface. In this respect, too, there is close resemblance to the conditions in the Cayuga and Seneca basins. One instance is described, that of the Canadia lake valley, in which the valley is hanging at both ends above Hemlock lake. From the evidence thus far discovered Dryer concludes that these valleys, which differ materially from normal stream valleys, are probably due to the erosive power of ice during the glacial period, and that the amount of deepening amounted to at least 400 feet. He states, however, that evidence recently discovered in the Cayuga and Seneca valleys, which opposes the theory of ice erosion, leaves the question of the origin of these peculiar valleys still in doubt. R. S. T.

RETIMBERING THE PINE LANDS OF MICHIGAN.—Last spring marked the beginning of reforestation work in the Michigan State Forest Reserve in Roscommon County. The plantation work consisted in the setting out of 30,000 white pine trees, 10,000 Scotch pine, and 10,000 Norway spruce. The planting was done at intervals of six feet, the ground being prepared by means of mattocks. Extensive seed beds were prepared for the raising of seedlings to be used in plantation work in 1906. The principal seedlings will be white pine, Norway spruce, and Scotch pine. The

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Senior class in Forestry at the University of Michigan assisted in all the work. The people of the State are heartily in favour of the forestry policy now being carried out. —(*Forestry Quarterly*, Vol. II, No. 4.)

HEIGHTS OF MOUNTAINS IN THE CANADIAN ROCKIES.—Mr. A. O. Wheeler says, in *Appalachia* (Vol 10, No. 4), that maps which represent the height of some Canadian mountains as between 15,000 and 17,000 feet above sea-level greatly exaggerate. In 1902 the Rev. James Outram ascended a number of high peaks of the Canadian Rockies, and made observations to ascertain their altitude. Dr. Norman Collie and others from 1892 to 1902 made similar observations. The general result was a decided decrease in the previously-accepted altitude of several of the highest mountains of the main range.

While conducting a topographical survey of the Selkirk Range for the Canadian Government, employing the photo-topographic method, Mr. Wheeler took a number of views from commanding Selkirk peaks, in which Mounts Columbia, Bryce, Lyell, and Forbes were readily identified. He desired to ascertain what degree of reliability might be placed upon the computation of altitudes at the long distances shown in the photographs and so determined the altitude of Chancellor Peak by the method employed in photo-topographic surveys. This altitude had previously been computed by the Topographical Survey from a series of angular readings, and established at 10,780 feet above sea-level. He now computed the height of Chancellor Peak from four views taken at different stations, and the mean result, 10,751 feet, was 29 feet less than that previously established. The result seems to promise altitudes for the four northern peaks that would closely approximate the truth. The results of his computations were these mean altitudes for the four mountains:

Mount	Columbia	12,740	feet, mean of	four	observations
"	Bryce	11,686	" "	six	"
"	Lyell	11,463	" "	four	"
"	Forbes	12,075	" "	four	"

EXPLORATION OF THE UPPER BASIN OF THE NETCHAKHOH.—The Rev. A. G. Morice, of the Missionary Station on Lake Stuart, British Columbia, has explored the large basin of the Upper Netchakhoh, an affluent of the Fraser River. His map and account of his explorations are printed in the *Bulletin* of the Neuchâtel Geographical Society (XV, 1904). He has rendered geographic service by his careful surveys in this little-known region, which extends between the Rocky Mountains and the coastal chain of the Pacific. A few geographical co-ordinates had been established by the Government, and upon these points Father Morice based the surveys of his itineraries. His numerous determinations of altitudes are the results of barometrical observations carried out at all the principal summits and the most important lakes. A number of soundings were made in most of the lakes visited, and at least one in all of them. Some of the lakes on the plateau or mountains are roughly circular in form and comparatively small, while the lakes of the valleys are much larger and very deep. Lake Morice, for example, is fifty-one miles long, and in this lake the explorer found the greatest depth of water (777 feet).

CUBA'S METEOROLOGICAL JOURNAL.—The Central Meteorological Station at Havana, under the control of the Secretary of Agriculture, Industry, and Commerce, prints a monthly *Boletín*, each number of which contains two charts, one showing the mean temperatures and the predominating winds of the month and the other the distribution and quantity of rainfall. These charts are preceded by a résumé of climatic conditions in the different provinces and monthly tables of meteorological observations.

AFRICA.

THE VICTORIA FALLS.—These falls, in the Zambezi River, about 1,000 miles from the coast, are remarkable for their width, height, and beauty, giving them rank among the greatest of the world's cataracts. Above the cataract the river flows almost on the surface of the plateau, branching in numerous arms between a series of islets. It then tumbles about 400 feet into a chasm and follows a peculiar zig-zag course into a cañon about 40 miles in length. The crest of the falls is not continuous but interrupted by three islands, which divide it into four falls of unequal width, the smallest 36 yards, the largest 573 yards broad. The rock, both at the crest of the falls and in the cañon, is a basalt, horizontally bedded, with some layers slightly less resistant than others, but with scarcely sufficient difference to account for the cataract, or the difference in resistance of the strata as in the case of Niagara.

Livingstone, who first discovered these falls, in 1860, ascribed them to fissuring of the crust, and all subsequent writers have accepted this explanation; but Molyneux, in a recent article (Geog. Journ., Vol. XXV, 1905, pp. 40–55), from which the above facts are taken, states a much more rational explanation, and supports it by a sufficient body of fact to lead to its acceptance. His explanation is that of simple river erosion, working irregularly, owing to the influence of the joint planes by which the basalt is traversed, in some places even to the extent of the development of basaltic columns. Taking advantage of the weakness resulting from areas of abundant joints the water works more rapidly in such places, and causes shifting of the form and position of the falls, which, however, continue to remain vertical, because the joints cleave the rock vertically. It is by following areas of abundant joints that the peculiar zig-zag course of the gorge below the falls is developed, and the author shows quite conclusively that portions of at least some of the zig-zags were the site of former falls during the process of upstream recession, which is still in progress.

Molyneux's discussion, which is illustrated by a map and nine full-page half tones, seems to explain the main features of the Victoria Falls, and, although there are some questions of detail which seem to call for explanation, will doubtless stand the test of future investigation. He makes some comparisons and contrasts with Niagara which the Victoria Falls rival in grandeur, and exceed in size. Had he been familiar with the Shoshone Falls, he would doubtless have found there some opportunities for more striking comparisons, though the Shoshone Falls are mere pigmies beside these giant falls. R. S. T.

ASIA.

EXPLORATION IN WESTERN TIBET.—On the return journey to India of the Tibetan Mission a small party under Captains Ryder and Rawling diverged from the main body for the purpose of ascending the valley of the Sangpo River in a general western direction, with a slight northing towards Gartok. This is one of the three marts to be opened for Indo-Tibetan trade under the provisions of the new treaty. It is 510 miles from Gyangtse, the other nearest Tibetan mart on the east and about 200 miles from Simla on the west. This part of Tibet has been practically unexplored. The party left Gyangtse on Oct. 10, and arrived at Shigatse in three days after a delightful journey through richly-cultivated and highly-irrigated valleys. Villages were dotted thickly over the slopes, every house and hamlet being surrounded with trees. The harvest had been good, and this part of Tibet was prosperous. The party were received in a most friendly manner by the Tibetan officials. Shigatse had not been seen by Europeans since Captain Turner's visit 120 years ago. The British officers describe the neighbouring monastery of Tashi-lhunpo as far finer than anything at Lhasa, its circumference being two miles. The monastery consists of

300 or 400 houses, besides temples and the palace of the Tashi Lama, who is at present, by virtue of the decree of the Emperor of China, the head of all the churches owning the supremacy of the Dalai Lama. The Tashi Lama received the Englishmen cordially. The party continued its long journey through the unexplored region toward Gartok, and the first news of its discoveries will probably come from Simla.

EUROPE.

DEPTHS OF THE NORTHERN FIORDS OF NORWAY.—Last summer Mr. Nordgaard made a series of soundings in the fiords of northern Norway which revealed unexpected depths at the entrances. These soundings along the coast between 67° 15′ and 68° 25′ showed the following results at or just within the mouths of the fiords:

Ofoten fiord, 550 meters; Ôsund, 630; Tys fiord, 725; Folden fiord, 530; Skjerstad fiord, 518. In Vest fiord, near Tranö, the soundings ranged from 630 to 680 meters. (*Naturen*, Bergen No. 12, 1904.)

CATALOGUE OF NORTHERN EUROPEAN FISH.—The International Council for the Exploration of the Sea has published in French at Copenhagen (*Publications de Circonstance*, No. 12) a catalogue of the fish observed in waters that are limited on the north by the Arctic Ocean, on the east by Novaya Zemlia, the Kara Sea and the Urals, on the south by the English Channel, and on the west by the east coast of Greenland, and further south by 25 W. Long. A. Günther's classification of fish, as prepared for the British Museum, is used, and not only the scientific names of the various subclasses, orders and families, but also the names by which the fish are known in the languages of North Europe are given. The catalogue also contains information on the nature of the waters that each fish frequents and its geographical distribution.

ATLANTIC WATER IN THE NORTH SEA.—The part assigned to Scottish hydrographers in the international scheme of Exploration of the Sea during 1903 related largely to the problem of the quantity of Atlantic water which flows in through the channels between Scotland and Shetland, and so enters the North Sea. The results are reported by Dr. A. J. Robertson, of Dundee (*Publications de Circonstance, No. 17*). Along the section from the North of Scotland to the Shetlands widely different conditions were found at the various seasons of the year. In May, 1903, the greater portion of this region was flooded by salt Atlantic water, which by August had greatly decreased in volume; in November very little Atlantic water was found here, and that was of comparatively low salinity. By February, 1904, the inflow into the North Sea had recommenced, but was not then quite so extensive as in May of the previous year. It seems, therefore, that during 1903 the Atlantic inflow underwent a variation with the seasons, with the maximum about March and a minimum about November. This conclusion accords with the surface salinity observations carried out along various routes over the North Sea in this period. While too much importance should not be attached to surface observations considered alone, most of the evidence indicates seasonal variation in the volume of Atlantic water entering the North Sea, the greatest inflow occurring early in the year, probably about March or April.

POST-GLACIAL CHANGES OF ATTITUDE IN THE ITALIAN LAKES.—Mr. Frank B. Taylor (Bull. Geol. Soc. Amer., Vol. XV, 1904, pp. 369–378) presents evidence that the levels of Lakes Maggiore, Como, and Garda formerly stood in different attitudes toward the land from that of the present. This evidence is mainly derived from a study of the delta cones of mountain torrents, the lakes being too narrow, the shores too steep, and the rock too hard for the development of continuous shore-line records;

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but in the broad, bulb-like southern end of Lago di Garda he found benches backed by cliffs, evidently wave-cut. Taylor's long experience in the study of the shore lines of higher levels of the American Great Lakes leads one to place entire confidence in his conclusions from the studies in the Italian lake valleys. From his observations he draws the conclusion that, as a result of land-tilting, the lake levels of the present are lower in the north than formerly. The surfaces of these lakes sloped to the south about one foot per mile as compared with their present surfaces. R. S. T.

POLAR.

THE ANTARCTIC.—Mr. E. Pariset has written a comprehensive summary of explorations in the Antarctic regions (*Vers la Terre Polaire Australe*, A. Rey, Lyons, France). The book does not contain the results of the voyage of the Scottish expedition in 1904, nor the detailed scientific results of the other recent explorations, which, in fact, are not yet published. With these exceptions it gives in 134 pages a concise and exact résumé of South Polar enterprises. The first chapter treats of the ideas of the Antarctic continent which prevailed previous to the XIXth Century. The author then sums up the work of the many navigators who visited the South Polar regions in that century, and describes the explorations and the scientific results, as far as they are as yet accessible, of the recent Belgian, German, Swedish, English, and Scotch expeditions, and of Mr. Borchgrevink's investigations in Victoria Land. The final chapter generalizes present information concerning glacial phenomena, meteorology, geology, and life in the Antarctic regions, and the book concludes with a bibliography of the most recent expeditions.

THE TEMPERATURE AT THE POLES.—A useful summary of the facts regarding the temperature of the poles, which have resulted from the meteorological work of recent polar expeditions, is given in the *Annales de Géographie* for July 15. A series of charts shows the mean summer and winter temperatures, so far as these are known, for the north and south polar areas. The lower summer temperatures of the Antarctic than of the Arctic are clearly brought out. The difference is ascribed to geographical conditions, the continental mass around the polar basin of the northern hemisphere being well warmed in summer, and this rise of temperature being felt to the vicinity of the pole. In the Antarctic a band of water encloses a mass of land. During the winter this water prevents the polar cold from advancing northwards; while in summer the water cannot warm the Antarctic area, whose mean temperature always remains low.—(*Scot. Geogr. Mag.*, Dec., 1904.) R. DEC. W.

METEOROLOGY IN THE ANTARCTIC.—At the November meeting of the Royal Meteorological Society, in London, Lieutenant Charles Royds, of the *Discovery*, gave an interesting address on *Meteorological Observing in the Antarctic*, which was illustrated with numerous lantern-slides. Lieutenant Royds was the officer specially charged with the meteorological observations during the recent British National Antarctic Expedition. The ship arrived at her winter quarters on February 8, 1902, and as soon as the water in the bay was frozen the meteorological instruments were set up on the ice. This became, to all intents and purposes, a land station in latitude 77° 50′ S., and observations were carried on there from April 17, 1902, until February 15, 1904, when the ice broke up and allowed the ship to go free. The observations were taken every two hours, those from 8 A. M. to 10 P. M. being taken by Lieutenant Royds, and the night observations being divided between the eleven officers and members of the scientific staff, each one taking a night.

The highest temperatures recorded in each year were 39° on December 26, 1902,

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and 42°, also on December 26, 1903. The lowest temperature registered during the stay in winter quarters was −59°.5 on August 20, 1903, while at Cape Armitage, a mile and a half to the south of the ship, the minimum on the same day was −64°.6. The lowest temperature registered at Cape Armitage, however, was −67°.7, at noon on July 19, 1902. The heaviest gale was on July 19, 1902, when for ten hours the anemometer gave a velocity of 85 miles an hour. Blizzards were frequent and added considerably to the difficulties of observing, as the drifting snow choked up the instruments and the screens, and also stopped the self-recording instruments. A peculiarity of the blizzards was the invariable rise of temperature; and they always came from the south and southwest.

It has sometimes been supposed that the sun seldom shows itself in the Antarctic regions. Lieutenant Royds, however, said that this was utterly wrong, as day after day there were most glorious clear skies and continuous sunshine. In proof of this he showed a lantern-slide of three cards from the Campbell-Stokes sunshine recorder, which had traces of 24 hours' continuous sunshine. The effect of the sun on the explorers' faces was very marked. During the winter, from living in artificial light, their faces turned yellow and various other colours, but when they went away sledging, and were out in the sunshine for nine or ten hours every day, their faces turned absolutely brown and their lips cracked, while the skin blistered and in many cases their faces became swollen. Lieutenant Royds said that he had never seen such beautiful and striking examples of every sort of cloud as south of the Antarctic circle. Mirages were common, as were haloes and coronæ, some of which were very beautiful and complicated. Auroræ were not uncommon, but they were not so highly coloured nor so brilliant as those seen in the Arctic region. R. DEC. W.

ISOTHERMS AROUND THE SOUTH POLE.—A comparison of the mean annual temperatures at the English, German, and Swedish Antarctic stations during 1902–03 has been made by W. Krebs in a recent paper in *Das Weltall* (Vol. IV, No. 24), with the result that the average decrease of temperature is found to have been 0.9° (0.5° C.) for each degree of latitude. Applying this value to the results obtained by the five stations in operation in the Antarctic region during the years 1898–1903, the writer of the paper above referred to has drawn approximate isotherms between latitudes 50° and 80° S. These isotherms are drawn for each 7.2° (4° C.) as far as 3.2° (−16° C.), which runs near the 70th parallel, between longitudes 60° E. and 60° W. Parts of the isotherm of −4° (−20 C.) are also drawn, reaching nearly to the 80th parallel. This is a considerable extension of our charted knowledge of Antarctic meteorology. R. DEC. W.

COMMERCIAL GEOGRAPHY.

BUSINESS OF THE KAISER WILHELM CANAL IN 1903–1904.—In the fiscal year ending March 31, 1904, 32,038 vessels of a net tonnage of 4,990,287 passed through Kaiser Wilhelm Canal between the North and Baltic Seas. The traffic was 28 vessels and 416,458 tons larger than in the preceding year. The steam vessels numbered 13,943, the sailing vessels 15,341 and the barges and lighters 2,734. Eighty-three per cent. of the vessels and sixty per cent. of the tonnage were under the German flag, the ships of other nations in order of importance being those of Denmark, Sweden, the Netherlands, England, Russia, Norway, Belgium, and France. For the first time the receipts of the canal were greater than its expenses. Most of the sailing vessels, loaded with timber or lumber for Baltic ports, passed through the Danish straits instead of the Kaiser Wilhelm Canal (*Moniteur officiel du Commerce*, Dec. 29, 1904).

THE SEAL CATCH FOR 1904.—The annual report of the U. S. Secretary of Commerce and Labor, says that during the year ending in August, 1904, 13,128 skins were taken and shipped, of which number 11,132 were obtained on St. Paul Island, and 1,996 on St. George Island. This is a decrease of 6,164 from the number of skins taken in 1903. The decrease was due largely to the reservation of young male seals for breeding purposes and other restrictions upon killing deemed necessary to preserve the life of the seal herd.

An industry pursued incidentally with that of sealing on the Pribilof Islands is that of raising the Blue Fox for its pelt. These animals are fed and cared for as if domesticated. Last winter 471 skins were taken on St. George Island. The proceeds of the skins are applied to the support of the native inhabitants, whose services are utilized in the taking and curing of the pelts.

NEW PORT ON THE RED SEA.—Mr. Corbett, the Financial Adviser of the Egyptian Government, said in his note on the Budget for 1905, that the Suakin-Atbara railroad is being built as rapidly as possible, and that it is hoped to complete it early in 1906. The sum of £E.150,000 has been set apart for the creation of a maritime terminus for the railroad at Sheikh el Barghout, some 30 miles to the north of Suakin. The new port, the official name of which has not yet been selected, has the great advantage over Suakin of possessing a commodious harbour, easily accessible to ships of heavy draft.

GENERAL.

GEOLOGIC EXPRESSION IN CONTOUR MAPS.—A paper with this title was prepared by Mr. N. H. Darton of the U. S. Geological Survey for the meeting of the Association of American Geographers at Philadelphia. It was mainly descriptive of a text-book now in preparation by the author, describing the development of earth forms and their representation on topographic maps. It is a widely-recognized fact that a knowledge of the geologic conditions under which topographic features are developed is an important aid to the topographer in preparing expressive maps, especially where sketching preponderates over the precise instrumental determination of details. For example, a topographer mapping a drift-covered district should know the conditions under which the characteristic drift topography was developed, in order readily to pick out the salient features and give them proper expression and prominence.

Again, in a region such as the Grand Cañon of the Colorado, where the strata lie nearly horizontal and there are widespread beds of harder and softer rocks in alternating series, a map made without proper understanding of the continuity of the hard bench-making layers and the softer strata that form the talus slopes, would be lacking in expression and not likely to give precise fit when geologic boundaries are added. The topographer who has appreciation of the geology would at once provide for the slight but important differences which arise when the beds cease to be horizontal and have even a slight dip; he will note also important distinctions between the cliffs due to limestone and those due to sandstone. Along many other lines, such as lake shores, glacial erosion in the high mountains, and volcanic products, the topographer understanding the principles of the physical development of these forms, can and does produce more expressive maps, and does so with greater economy than the conscientious sketcher whose method is purely mechanical.

THE INFLUENCE OF CAVERNS ON TOPOGRAPHY.—Prof. Russell (Science, Vol. XXI, 1905, pp. 30–32) has made an exceedingly interesting suggestion concerning a possible influence of caverns on topography, which, so far as the writer knows, is a

new point of possible important significance. While limestones, being usually weak rocks, have commonly been worn down to form valleys between the strata of more resistant nature, there are some instances in which limestones stand up prominently above the surrounding strata. The two cases which he especially mentions are those of the rock of Gibraltar and Mackinac Island in Lake Huron. Russell calls attention to the fact that near Luray, Virginia, there is a low limestone hill, with extensive caverns beneath it, which has been left in relief because so honeycombed with caverns that the rain readily percolated into it, thus preventing the formation of surface streams.

On the surrounding land surface streams were able to gather and mechanically erode, thus lowering the surface. The same explanation is proposed as an hypothesis to account for the presence of the elevations at Mackinac Island and Gibraltar. It will be interesting to apply this explanation to these and other instances and see whether it accounts for all the facts, for if it does we have here a new principle in explanation of topographic forms which will be of far wider application than to the exceptional instances discussed. R. S. T.

U. S. BOARD ON GEOGRAPHIC NAMES. DECISIONS DECEMBER 7, 1904, JANUARY 4 AND FEBRUARY 1, 1905 :

ASHNOLA: river, Okanogan county, Washington (and B. C., Canada; crosses boundary at 120° 20'). (Not Na-is-nu-loh, Ashtnulon, Naisnuloh, Nais-nu-loh, Naisnulho, nor Ashanola.)

BEAR LODGE: mountains: Crook county, Wyoming. (Not Bearlodge.)

CAKEPOULIN: creek, Franklin twp., Hunterdon county, New Jersey. (Not Cakepaulins.)

CENTRAL CITY: town (P. O., R. R. station, and county seat) Gilpin county, Colorado. (Not Central.).

CHEWACK: creek, tributary of Methow River (from the north, mouth at Winthrop), Okanogan county, Washington. (Not Che-wuch Creek, Chewach Creek, Chewak Creek, Chiwak, Chewach, Chewuck, nor North Fork.)

CONCONULLY: lake, Okanogan county, Washington. (Not Salmon.)

* EGG: island near easternmost point of Unalaska, eastern Aleutians, Alaska. (Not Ugalgan nor Ugalgal.)*

ELLEMEHAM: mountain, Okanogan county, Washington. (Not Ellemachun, Ellomachan, nor Mt. Ellemeham.)

* ENGLISH: bay indenting the eastern shore of Unalaska island, eastern Aleutians, Alaska. (Not Samganuda.)*

FRASER: river, tributary from south to Grand River, P. O., and Precinct, Grand county, Colorado. (Not Frazier nor Frazer.)

INDIAN: creek, tributary from south to Bear creek, Clear Creek county, Colorado. (Not South Fork Bear Creek, Roeder, nor Yankee.)

LAKE CLEAR: lake or pond in Harrietstown, Franklin county, New York. (Not Big Clear Pond nor Clear Pond.)

LATAH: creek, Spokane and Whitman counties, Washington, and Kootenai county, Idaho, tributary from S. E. to Spokane River at Spokane. (Not Hangman, Hangmans, Latah and Hangman's, Latah and Hangman, Lau-taw, nor Camas Prairie.)

* NORTH HEAD: cape, the northern point of Akutan island, eastern Aleutians Alaska. (Not Sigak.)*

* Revision of previous decision.

OLD BALDY: peak in the Santa Rita Mountains, Santa Cruz county, Arizona. (Not Baldy, Mt. Wrightson, nor Santa Rita.)

QUENESKA: island in Shelburne town, off Shelburne Point, in Lake Champlain, Vermont. (Not Hog, Whites, nor White's.)

REED: P. O. and R. R. station, Henderson county, Kentucky. (Not Reads.)

RILLITO: creek, four miles north of Tucson, Pima county, Arizona. (Not Rita.)

ROLLINS: pass, over Front Range (Continental Divide), lat. 39° 56′, Boulder and Grand counties, Colorado. (Not Boulder nor Rogers.)

ROOTOK: island near west end of Aratanak island, Krenitzin group, eastern Aleutians, Alaska. (Not Aektok nor Rootak.)

SALMON: creek, tributary from the north to Okanogan River, Okanogan county, Washington. (Not Conconully, Concunully, nor White Salmon.)

SAN ANTONIO: creek or river emptying into the Pacific Ocean three miles north of Purisima Pt., Santa Barbara county, California. (Not Jesus Maria River, Guaymas River, nor Los Alamos.)

SIMON: pond, town of Altamont, Franklin county, New York. (Not Simons, Big Simon, Big Simons, Simonds, nor Big Simonds.)

SINLAHEKIN: creek, tributary from the south to Palmer lake, Okanogan county, Washington. (Not Sinlehekin, Sinlahekim, Waring-Sinlehegan, Waring, Toudes Coulé, nor Sinlahegan.)

SUNSET: island, Colchester town, in Lake Champlain, Vermont. (Not Hog Back.)

VALDEZ: glacier, narrows, port, summit, and town, Prince William sound, Alaska. (Not Valdes.)

VANCE: creek, tributary from north to Bear creek, Clear Creek county, Colorado. (Not Little Bear.)

WHALEBONE: cape between Usof and Three Island bays, on south coast of Unalaska, Alaska.

BERGENFIELD: borough, P. O., and R. R. station, Bergen county, N. J. (Not Bergenfields nor Bergen Fields.)

BRUSTER: town and P. O. on the Columbia river, Okanogan county, Wash. (Not Brewster.)

CHILIWIST: creek, tributary from the N. W. to the Okanogan river, Okanogan county, Wash. (Not Chilliwist, Chiliwhist, Chilliwhist, nor Chilowist.)

ECORSE: river, township, P. O., and R. R. station, Wayne county, Mich. (Not Ecorce, River aux Ecorces, nor Ecorces.)

ESTY: glen, north of Ithaca, N. Y. (Not Estey.)

FACTORY: creek in Wayne and Lawrence counties, Tenn. (Not Factory's, Factor's, nor Factors.)

FALSE BOTTOM: creek in Lawrence and Butte counties, S. D. (Not Falsebottom.)

INDIAN: creek in Wayne and Hardin counties, Tenn. (Not Reinness, Reinse's, nor Reinses.)

KOUGAROK: river, tributary to the Kuzitrin river; mountain; mining district; and mining town; Seward Peninsula, Alaska. (Not Kugruk, Koogrock, Kougrok, Kugrock, nor Kugruk City.)

KUGRUK: river, flowing into Kotzebue Sound, just east of Cape Deceit, Alaska. (Not Swan.)

KUGRUPAGA: river, Seward Peninsula, Alaska, flowing into the Arctic Ocean, at Long. 166° 45′. (Not Kugruk nor Koogrook.)

LOUP LOUP: creek, tributary to the Okanogan river, near Malott, Okanogan county, Wash. (Not Loop Loop, Loop-Loop, nor Looploop.)

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* Revision of previous decision.

PALISADES: township, Bergen County, N. J. (Not Palisade.)

ROGERS: island in Hudson river, Columbia county, N. Y. (Not Rodgers.)

WANNACUT: lake, Okanogan county, Wash. T. 39 N. R. 26 E. (Not Waunakee, Wennacut, Wonacot, Wannacott, Wanicot, Wanacott, Wannicutt, nor Wannicut.)

WEATHERFORD: creek, Wayne county, Tenn. (Not Rutherford, Rutherford's, nor Rutherfords.)

BELLEVIEW: township, Washington county, Missouri. (Not Belview, Bellview, nor Bellevue.)

CHILICOTAL: spring and mountain, Brewster county, Texas. (Not Chili Corte, Chili Cortal, nor Chili Cotel.)

EAST BRANCH CHENANGO RIVER: stream, branch of Chenango river, in Oneida, Madison, and Chenang counties, New York. (Not East Chenango River nor Chenango Creek.)

KENNYETTO: creek, Fulton county, New York. (Not Kenneto.)

MOUNT VERNON: P. O. and town, Hillsboro county, New Hampshire. (Not Mt. Vernon nor Mount Vernon.)

SAN CRISTOBAL: lake, Hinsdale county, Colorado. (Not San Cristoval, nor San Cristopal.)

STASER: P. O. and R. R. station, Vanderburg county, Indiana. (Not Stacer, Stacers, nor Stasers.)

The Board on Geographic Names was constituted by Executive Order of September 4, 1890, and its decisions are accepted by all the Departments of the Government; now and again to the surprise of mankind. None the less, there are bounds to authority, and it is not easy to believe that the Attorney-General or the Secretary of State will write *Belleview* for *Bellevue*, out of deference to the Board.

(EDITOR BULLETIN.)

OBITUARY.

ADMIRAL SIR ERASMUS OMMANNEY.—This well-known Arctic explorer died in England in December last. He was born in 1814, entered the navy in 1826, and was promoted to the rank of captain in 1846. In 1850–51 he commanded the *Assistance* in the Arctic search expedition under Capt. Horatio Austin, and discovered on Aug. 25, 1850, the first traces of Sir John Franklin, which proved that his ships had wintered at Beechey Island. He also directed an extensive system of sledge journeys, by which the coast of Prince of Wales Land was laid down.

DR. A. M. STÜBEL.—This explorer, ethnologist and geologist, who was especially well known through his studies in vulcanology, died in Dresden on November 10 last. He was sixty-nine years old.

NEW MAPS.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States.

No. 113. Huron Folio. South Dakota. Area, 857 square miles. Between parallels 44° and 44° 30′ N. Lat., and meridians 98° and 98° 30′ W. Long. Scale, 1:125,000, or 1.9 statute mile to an inch. Lies in the valley of the James River, which has a general southward course across the eastern half of the quadrangle. The region is flat and its features are those of subdued glacial topography, the basins being shallow and far apart and the swells very low. All the streams belong to the

James River system. The quadrangle is covered with glacial drift, with the exception of the alluvial flats along the streams. It contains no deposits of valuable minerals or coal, and the most abundant stone is in the form of boulders brought by the glaciers of the Pleistocene period. Underground water is the source of shallow, artesian, and tubular wells.

No. 115. Kittanning Folio. Pennsylvania. Area, 226 square miles. Scale, 1:62,500, or 0.9 statute mile to an inch. Between parallels 40° 45′ and 41° N. Lat., and meridians 79° 30′ and 79° 45′ W. Long. Forms a part of the Appalachian Province. The Allegheny is the principal stream. The surface is hilly, the valleys are narrow, with precipitous sides and narrow or no flood-plains, so that they contain little land suitable for cultivation. Farming is mostly confined to the uplands and manufacturing and mining to the valleys. Bituminous coal is the most important mineral resource, petroleum and natural gas being also very prominent. Limestone and sandstone are extensively quarried.

UNITED STATES.—Land Classification Map of the Livingston Quadrangle, showing part of the Yellowstone Forest Reserve, Montana. Scale, 1:250,000, or 3.7 statute miles to an inch. Contour interval, 200 feet. U. S. Geological Survey, Washington, 1903.

In Professional Paper No. 29. The areas are distinguished by colours, according to their availability for agriculture or grazing and the quantity of lumber per acre that the forests may yield.

UNITED STATES.—Land Classification Features of the Big Timber, Granite Mountain and Red Lodge Quadrangles, Montana, including part of the Yellowstone Forest Reserve. Scale, 1:250,000, or 3.7 statute miles to an inch. Contour interval, 200 feet. By John D. Leiberg. U. S. Geological Survey, Washington, 1903.

In Professional Paper No. 29. Four tints of blue show the forest yield of lumber per acre; grassy, alpine, bare rocks, and agricultural areas and snow fields are distinguished.

CANADA.—Carte des Sources et du Bassin Supérieur de la Netchakhoh. Scale, 1:600,000, or 9.4 statute miles to an inch. By A. G. Morice. *Bulletin* of the Neuchâtel Geographical Society, Vol. XV, 1904.

The compiler is a missionary, who has traced many of the streams and lakes of this inadequately-mapped part of British Columbia, and whose itineraries, as recorded on this excellent map, contribute important data for the region.

ARGENTINA.—Mapa General de la República Argentina y de los Paises Limítrofes. Scale, 1:2,500,000, or 39.4 statute miles to an inch. By Col. Don Jorge J. Rohde. Published under the auspices of the Instituto Geográfico Argentino, Buenos Aires, 1896.

A four-sheet map of Argentina, the larger part of Chile, the south of Bolivia, the southeastern States of Brazil, Paraguay, and Uruguay. Indicates all the steamship lines entering the La Plata River, the railroads built or in construction, explorers' routes, Indian tribes, and differentiates the towns according to their importance. The nomenclature is very much larger than in the atlases before the public, and numerous little lakes not seen on ordinary maps are shown. Elevations above sea are in meters, all the mining regions are denoted, and large-scale insets show the City of Buenos Aires and its environs and the island of Martin Garcia. This map will be useful to map-makers, excepting that the new boundary between Argentina and Chile must be used.

CHILE.—Golfo Corcovado, Estero Palvitao, Rio Yelcho y Ensenada Chaiten.

Chart No. 106. Scale, 1:50,000, or 0.7 statute miles to an inch. By the Hydrographic Office, Santiago, Chile, 1904.

The Gulf of Corcovado separates the mainland from the southern part of the large island of Chiloe. The large scale permits the delineation of all important topographic features. Soundings and heights in meters.

CHILE.—Parte Occidental del Canal Beagle. Scale, 1:250,000, or 3.7 statute miles to an inch. Chart 98, Hydrographic Office, Santiago, Chile, 1904.

This black chart shows the Beagle Channel between the Brecknock Peninsula and Tres Brazos, with many soundings, the ship channel and seven profiles of the coast mountains.

DUTCH GUIANA.—Kaart van het tot Suriname behoorende Stroomgebied van Lawa, Litanie en Goninie. Scale, 1:500,000, or 7.8 statute miles to an inch. *Tijdschrift* of the Royal Netherlands Geographical Society, Vol. XXII, No. 1, Amsterdam, 1905.

This map accompanies a report by Lieut. A. F. Herderschee on the Goninie Expedition in Dutch Guiana. The Survey covers the upper part of the Surinam basin; and as the entire region was practically unknown, this excellent survey provides a large number of new facts for maps of the south-central part of Dutch Guiana. The Lawa, Litanie, and Goninie were traced to their sources among the Oranje and Tumuc-Humac Mountains. These streams, being interrupted by numerous cataracts, are not available for navigation. Many elevations were determined. Heights are given in meters, and the settlements of Indians and Bush negroes are indicated.

SOUTH AMERICA.—Anteil der Deutschen an der Erforschung Südamerikas. Scale, 1:30,000,000, or 473.4 statute miles to an inch. By Paul Langhans. *Deutsche Erde*, No. 6, 1904, Justus Perthes, Gotha.

Shows the areas explored by German travellers in the 16th, 17th, 18th and 19th centuries, and traces von Humboldt's route of 1800.

AFRICA.

AFRICA.—Afrique. Chemins de Fer, Navigation à Vapeur. Scale, 1:17,500,000, or 276.2 statute miles to an inch. *Annales de Géographie*, No. 72, 1904. Librairie Armand Colin, Paris.

Illustrates an article in the *Annales de Géographie* on African railroads. It is the best map showing African steam transportation now before the public. It does not confuse the information given by inserting a large number of railroad projects, but shows only railroads that are in operation or in course of construction. The railroads are in red, and the navigable parts of rivers and lakes serviceable for steam transportation in blue. Ocean cables are also shown. All this information is imposed upon an admirable atlas map of Africa, which is rich in place-names, and brings political information down to date.

PORTUGUESE EAST AFRICA.—Carte du Bas-Limpopo. Scale, 1:1,500,000, or 23.67 statute miles to an inch. By Henri Berthoud. *Bulletin* of the Neuchâtel Geographical Society, Vol. XV, 1904.

Shows the numerous itineraries of Mr. Berthoud in Portuguese East Africa between 1881 and 1898. These journeys contributed some important facts to our knowledge of this part of Africa. He uses the figures of Portuguese explorers for altitude, though admitting that they are probably exaggerated.

MADAGASCAR.—Chemin de fer entre Brickaville et Fanovana. No scale. *Revue de Madagascar*. Vol. 6, No. 12. Paris, 1904.

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Shows the route of the railroad recently opened between Brickaville, near the east coast, and Fanovana, 65 miles, together with the extension of the railroad now building and the wagon road from the Indian Ocean to Tananarivo.

ASIA.

ARABIA.— Land Surface Features of Arabia. Scale, 1:10,000,000, or 157.8 statute miles to an inch. By J. G. Bartholomew, Edinburgh Geographical Institute, 1904.

ARABIA.—Orographical Features of Arabia. Same scale and publisher as above.

These fine maps of Arabia give practically all that is yet known of its topographic and cultural features. Six tints show cultivated and cultivable land, steppes, deserts, mountain vegetation, and fresh and salt lakes ; the heights above sea-level are indicated by red and six tints of brown ; sea depths by three shades of blue.

CHINA.—Plan of Kiukiang. Scale, 1 centimeter=75 yards. *Trade Reports* for 1903, Shanghai, 1904.

CHINA.—Yangtse River. Scale, 1:126,730, or 2 statute miles to an inch. *Trade Reports* for 1903, Shanghai, 1904.

The surveys of the south channel at the mouth of the river, made in 1896 and 1903, are printed together, showing the difference in soundings taken at the two periods.

CHINA.—Woosung River Entrance. Scale, 4 cables=1½ inches. *Trade Reports* for 1903, Shanghai, 1904.

The soundings in feet made at the outer bar of the Woosung River, on which Shanghai stands, in 1901 and 1904 are printed together for purposes of comparison.

CHINA.—Map of Eastern Manchuria (in 2 sheets). Scale, 1:840,000, or 13.2 statute miles to an inch. By E. E. Anert. *Memoirs* of the Imperial Russian Geog. Soc., Vol. XXXV, St. Petersburg, 1904 (in Russian).

Shows the routes of four Russian travellers, together with the distribution of mineral deposits, towns, telegraph and post stations, rail and other roads, forts arsenals, important commercial centres, etc.

CHINA.—Geological Map of Eastern Manchuria (in 2 sheets). Scale, 1:840,000, or 13.2 statute miles to an inch. By E. E. Anert. *Memoirs* of the Imperial Russian Geog. Soc., Vol. XXXV, St. Petersburg, 1904 (in Russian).

SIBERIA.—Map of the northern part of the Government of Tobolsk (in 2 sheets). Scale, 1:680,000, or 10.7 statute miles to an inch. *Izviestia* of the Imperial Russian Geog. Soc., Vol. XL, St. Petersburg, 1903 (in Russian).

Illustrates a geographical description of northern Tobolsk by Mr. A. A. Dunin-Gorkavitch.

TIBET.—Plan von Lhasa. Scale, 1:240,000, or .37 statute mile to an inch. *Deutsche Rundschau für Geog. und Stat.*, Vol. XXVII, No. 4, A. Hartleben, Vienna, 1905.

An excellent map in colours, based upon the latest information concerning the plan of Lhasa.

EUROPE.

AUSTRIA-HUNGARY. — Regenverteilung an der Bucht von Cattaro. Scale, 1:200,000, or 3.1 statute miles to an inch. By Prof. Dr. K. Kassner. Justus Perthes, Gotha. *Petermanns Mitteilungen*, Vol. 50, No. 12, 1904.

Illustrates an article by Dr. Kassner on this region, which has the heaviest rain-

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fall in Europe. Isohyetal lines connect places having the same amount of annual rainfall, the heaviest precipitation being on the mountains back of the coast.

FRANCE.—Carte Économique du Département d'Indre-et-Loire. Scale, 1:275,000, or 4.3 statute miles to an inch. *Revue* of the Tours Geographical Society, Vol. 21, No. 2, Tours, 1904.

This large-scale map contains a remarkable amount of economic information, including the location of all important manufacturing and mining industries, the distribution of agriculture and the predominant crops, railroads, and the extent of navigation.

SCOTLAND.—Botánical Survey of Scotland. (Fife Sheet.) By the late Robert Smith and Wm. G. Smith. Scale, 1:126,720, or 2 statute miles to an inch. *Scot. Geog. Mag.*, Jan., 1905, Edinburgh.

A beautiful map, prepared by the Edinburgh Geographical Institute, showing by fourteen symbols the predominating types of vegetation and cultivation in eastern Scotland, chiefly between the Firths of Tay and Forth.

POLAR.

ANTARCTIC.—Map showing the track of the *Scotia*, 1903–1904. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. *Scot. Geo. Mag.*, January, 1905.

Shows the tracks of the Scottish National Antarctic Expedition in its voyages in Weddell Sea during 1903 and 1904. Many soundings in fathoms are given, the coast-line of Coats Land, the part of Antarctica discovered by this expedition, is shown for over 150 miles, and the tracks of earlier explorers are represented in hair lines. This chart completes the most important information required to give on atlas sheets an accurate delineation of the additions to our knowledge of the Antarctic regions made by the recent expeditions.

ATLASES.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 39–40. Justus Perthes, Gotha, 1904. Price, 60 pf. for each part containing 2 map sheets.

No. 8 is a new map of Europe giving more detailed information of the surrounding ocean depths than the sheet it replaces. Other new features are the cable connections with other lands, the main lines of the continental railroad system, and the differentiation of towns according to population. No. 66 replaces the old sheet "Ostindische Inseln" with a new one, "Hinter-Indien und Archipel" on the same scale —1:12,500,000, or 197.2 statute miles—but with much more information clearly and handsomely presented. Insets show Tonkin, Upper Laos and Cambodia, and Cochin-China on a scale of 1:7,500,000, or 118.35 statute miles to an inch; and Canton and Hongkong on a scale of 1:3,750,000, or 59.18 statute miles to an inch. The seven Africa sheets in the new edition will be from entirely new plates. No. 74 shows South Africa as far north as Bulawayo on a scale of 1:5,000,000, or 78.9 statute miles to an inch; and No. 73 gives Somali Land and Madagascar on a scale of 1:7,500,000.

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AFRICA.

AFLALO, M.—The Truth about Morocco. London, John Lane, 1904. 8vo.

AFRICA, SOUTH, Guide to.—Edited by A. S. Brown and G. Gordon Brown, for the Union-Castle Mail Steamship Co. 1904–1905 Edition. Maps, Plans, etc. London, Sampson, Low, Marston & Co. (1904). 16mo.

CROOKS, J. J.—History of the Colony of Sierra Leone, Western Africa. With Maps and Appendices. Dublin, Brown and Nolan, 1903. 16mo.

DROUET, FRANCIS.—Au Nord de l'Afrique. Notes de Voyage. [Illustrations.] Nice, Place Sasserno, 1896. 4to.

EGYPT EXPLORATION FUND.—The Oxyrhynchus Papyri, *Part IV.* Edited, with Translations and Notes, by Bernard P. Grenfell and Arthur S. Hunt. Eight Plates. London, Egypt Exploration Fund, 1904. 4to.

FERRAND, GABRIEL.—Les Çomâlis, Parts, Ernest Leroux, 1903. 12mo.

GARSTIN, SIR WILLIAM.—Report upon the Basin of the Upper Nile, etc. With Maps and Appendices. Cairo, National Printing Dep't, 1904. Folio. [*Gift, from the Survey Dep't, Public Works Ministry, Cairo, Egypt.*]

GEERE, H. VALENTINE.—By Nile and Euphrates. Maps and Illustrations. Edinburgh, T. and T. Clark, 1904. 8vo. (Imported by Charles Scribner's Sons, New York.)

GIOLI, GINO BARTOLOMMEI.—La Colonizzazione Agricola dell' Eritrea. Memoria letta alla R. Accademia dei Georgofili nell' Adunanze ordinarie del di 4 Gennaio e 1. Febbraio 1903. Firenze, Bernardo Seeber, 1903. 8vo.

MATTHEWS, T. T.—Thirty Years in Madagascar. 62 illustrations. London, Religious Tract Society, 1904. 8vo.

MOCKLER-FERRYMAN, A. F.—British Nigeria. With map, illustrations and Appendix. London, Cassell & Co., 1902. 8vo.

MULAZZANI, A.—Geografia della Colonia Eritrea. Con 52 incisioni e una carta geografica. Firenze, R. Bemporad & Figlio [1904]. 16mo.

NEGREIROS, ALMADA.—Le Mozambique. Avec Cartes et Gravures. Paris, Augustin Challamel, 1904. 8vo.

VELTEN, C., UND LIPPERT, J.—Afrikanische Studien: 1902, 1903. *Mittheilungen des Seminars für Orientalische Sprachen zu Berlin. Jahrgang V–VI, Dritte Abtheilung.* Berlin, G. Reimer, 1902–1903. 2 vols., 8vo.

WRIGHT, E. H. SMITH.—Railways in Rhodesia. With a Description of the Victoria Falls by E. F. Knight. [Illustrations and maps.] (London, British South Africa Co., 1904.). pr., 4to.

AMERICA.

BOMAN, E.—Groupes de Tumulus Préhispaniques dans la Vallée de Lerna (République Argentine). *Extrait de L'Homme Préhistorique, 1904, No. 10.* Paris, Schleicher Frères et Cie, 1904. pr., 8vo. [*Gift, from the Author.*]

BRAZIL AND BOLIVIA BOUNDARY SETTLEMENT.—Treaty . . . signed at Petropolis, Nov. 17, 1903. With Report of Baron Rio Branco. (Maps.) New York, Knickerbocker Press, 1904. pr., 8vo.

BURNABY, ANDREW.—Travels through the Middle Settlements in North America. [With map.] Reprinted from the Third Edition of 1798. With Introduction and Notes by Rufus Rockwell Wilson. New York, A. Wessels Co., 1904.

CONNECTICUT VALLEY HISTORICAL SOCIETY.—Papers and Proceedings. 1876–1881. Springfield, Mass., Pub. by the Society, 1881. 8vo.

EDWARDS, WILLIAM SEYMOUR.—In To The Yukon. With Illustrations. Cincinnati, The Robert Clarke Co., 1904. 8vo.

HELPS, SIR ARTHUR.—The Spanish Conquest in America. *Vol. IV.* New Edition. Edited, with Introduction, Maps and Notes, by M. Oppenheim. London, John Lane, 1904. 8vo.

HILL, ROBERT T.—Geology and Physical Geography of Jamaica: A Study of Antillean Development. With Appendix on Corals by T. Wayland Vaughan. 41 Plates. Cambridge, 1899. 8vo. *Bulletin, Museum of Comparative Zoölogy at Harvard College, Vol. XXXIV.*

HOUGH, FRANKLIN B.—American Constitutions: Comprising the Constitution of each State in the Union, and of the United States, &c. [With Map, &c.] Albany, Weed, Parsons & Co., 1872. 2 vols., 8vo.

HULBERT, ARCHER BUTLER.—Historic Highways of America, Vol. 14: Great American Canals, Vol. 2, The Erie Canal. Cleveland, The A. H. Clark Co., 1904. 8vo.

KLEIN, FÉLIX.—Au Pays de "La Vie Intense." Paris, Plon-Nourrit et Cie., 1904. 16mo.

LAUT, A. C.—Pathfinders of the West. Being the Thrilling Story of the Men who Discovered the Great Northwest: Radisson, La Vérendrye, Lewis and Clark. Illustrations. New York, The Macmillan Co., 1904. 8vo.

MARTIN DE MOUSSY [J. A.] V.—Mémoire Historique sur la Décadence et la Ruine des Missions des Jésuites dans le Bassin de La Plata. [Cartes.] Paris, Ch. Douniol, 1864. 8vo.

[MEXICO.]—Le Mexique au Début du XX^{e} Siècle. Par MM. Roland Bonaparte, Léon Bourgeois, Jules Clarétie [and Thirteen Others]. (Cartes, &c.) Paris, Ch. Delagrave [1903?]. 2 Tomes. 4to. [*Gift, from the Mexican Government.*]

NEW HAMPSHIRE HISTORICAL SOCIETY, Collections of the. *Vols. 7 and 8.* Concord, Pub. by the Society, 1863, 1866. 8vo.

OBER, FREDERICK A.—Our West Indian Neighbors, &c. (Illustrations.) New York, James Pott & Co., 1904. 8vo.

PERL, ALBERT.—Durch die Urwälder Südamerikas. Mit Sechzig Abbildungen und einer Karte. Berlin, Dietrich Reimer (Ernst Vohsen), 1904. 8vo.

POTE, WILLIAM, JR.—The Journal of. During his Captivity in the French and Indian Wars, 1745–1747. (With an Account of the Pote Journal, by John Fletcher Hurst; Historical Introduction, by Victor H. Paltsits.) [Maps, &c.] New York, Dodd, Mead & Co., 1896. 8vo. [*With reproduction of Charles Morris's Map of the Northern English Colonies, &c., 1749, in separate cover.*]

QUEVEDO, SAMUEL A. LAFONE. *Translator and Editor.* Viaje (de Ulrich Schmídel) al Río de La Plata (1534–1554). Notas Bibliográficas y Biográficas por

Bartolomé Mitre. [Reproduced illustrations and maps.] Buenos Aires, Cabaut y Cía, 1903. 8vo.

SAN FRANCISCO, Panorama of. From California St. Hill. By Edw. J. Muybridge. San Francisco, 1877. [Photograph, mounted on cloth and folded in folio cover.]

SPEARS, JOHN R.—The American Slave-Trade. Illustrated. New York, Chas. Scribner's Sons, 1900. 8vo.

WILLIAMS, WALTER, *Editor*.—The State of Missouri. (With Maps, &c.) (Columbia, Mo.) Missouri Commission, 1904. 8vo.

ARCTIC.

LECLERCQ, JULES.—Une Croisière au Spitsberg sur un Yacht Polaire. Gravures et carte. Paris, Plon-Nourrit et Cie., 1904. 16mo.

SVERDRUP, OTTO.—New Land: Four Years in the Arctic Regions. Translated from the Norwegian by Ethel Harriet Hearn. Illustrations and Maps. London, Longmans, Green & Co. 1904. 2 vols., 8vo.

WARREN, WILLIAM F.—Paradise Found: The Cradle of the Human Race at the North Pole. Illustrations. 11th Edition. Boston, Houghton, Mifflin & Co., 1898. 8vo.

ASIA.

CLIFFORD, HUGH.—Further India: The Story of Exploration . . . in Burma, Malaya, Siam and Indo-China. Illustrations and maps. New York, Frederick A. Stokes Co., 1904. 8vo.

DAVIDSON, AUGUSTA M. CAMPBELL. — Present-Day Japan. (Illustrations.) Philadelphia, J. B. Lippincott Co., 1904. 8vo.

ENSELME, H.—À Travers la Mandchourie: Le chemin de fer de l'Est Chinois, &c. 26 gravures, 3 plans et 1 carte. Paris, J. Rueff, 1904. 12mo.

FRANKE, O.—Geistige Strömungen im heutigen China. Vortrag, gehalten in der Abteilung Berlin-Charlottenburg der Deutschen Kolonial-Gesellschaft. Berlin, Dietrich Reimer, 1904. pr., 8vo.

GEIL, WILLIAM EDGAR.—A Yankee on the Yangtze. With 100 illustrations. New York, A. C. Armstrong & Son, 1904. 8vo.

GOTTWALDT, H.—Die überseeische Auswanderung der Chinesen und ihre Einwirkung auf die gelbe und weisse Rasse. Bremen, Max Nössler, 1903. 8vo.

HEARN, LAFCADIO.—Japan: An Attempt at Interpretation. [Illustrated.] New York, The Macmillan Co., 1904. 8vo.

HEARN, LAFCADIO.—Kwaidan: Stories and Studies of Strange Things. [Illustrated.] Boston, Houghton, Mifflin & Co., 1904. 16mo.

HEDIN, SVEN.—Scientific Results of a Journey in Central Asia, 1899–1902. *Vol. I:* The Tarim River. (Maps and Plates.) *Vol. VI, Part I:* Zoologie von Wilhelm Leche. [With Plates.] *Maps, I.* Pl. 1–16, and I–XIV. Stockholm, General Staff of the Swedish Army. 1904. 4to, and Maps, folio.

HOURST, LIEUT.—Dans les Rapides du Fleuve Bleu. Voyage de la Première Canonnière Française sur le Haut Yang-Tse-Kiang. Gravures (et carte). Paris, Plon-Nourrit et Cie, 1904. 8vo.

JAPAN in the Beginning of the 20th Century. Published by the Imperial Japanese Commission to the Louisiana Purchase Exposition. (Printed at Tokyo, Japan Times Office.) 1904. 8vo. [*Gift, from the Japanese Legation, Washington.*]

XUM

LEVAT, E. D.—Richesses Minérales des Possessions Russes en Asie Centrale. (6 Planches.) *Extrait des Annales des Mines, livraisons de Février et Mars, 1903.* Paris, Vve. Ch. Dunod, 1903. 8vo.

NIPPOLD, OTFRIED.—Die Entwicklung Japans in den letzten fünfzig Jahren. Bern, K. J. Wyss, 1904. pr., 8vo.

OLUFSEN, O.—Through the Unknown Pamirs. The Second Danish Pamir Expedition, 1898–99. Maps and Illustrations. London, William Heinemann, 1904. 8vo. [*Gift, from the Author.*]

PAVIE, AUGUSTE.—Mission Pavie, Indo-Chine: Études Diverses, Tome III.; Géographie et Voyages, Tomes IV et V. Paris, Ernest Leroux, 1902, 1904. 4to.

PHILIPPINE ISLANDS, 1493–1898.—Explorations by Early Navigators, &c., as related in contemporaneous Books and MSS. Translated from the Originals. Edited, etc., by Emma Helen Blair and James Alexander Robertson. With maps, etc. Vols. XIX, XX, XXI. Cleveland, A. H. Clark Co., 1904–1905. 8vo.

PITON, CHARLES —La Chine: sa religion, ses mœurs, ses missions. 32 gravures. Lausanne, Georges Bridel & Cie. (1902.) 16mo.

REES, J. D.—Russia, India and the Persian Gulf, or the Western Frontiers of India. (*Published as an article in the* Asiatic Quarterly Review *for April, 1903.*) With speeches by the Right Hon. Sir Charles W. Dilke, Sir George Birdwood, and Mr. H. F. B. Lynch. London, Harrison & Sons, 1903. pr., 8vo.

SCOTT, J. E.—In Famine Land: Observations and Experiences in India, . . . 1899–1900. Illustrated. New York and London, Harper & Brothers, 1904. 8vo.

SYKES, MARK.—Dar-Ul-Islam. A Record of a Journey through ten of the Asiatic Provinces of Turkey. Appendix by John Hugh Smith. Introduction by E. G. Browne. Maps and Illustrations. London, Bickers & Son; New York, Charles Scribner's Sons, 1904. 8vo.

WEALE, B. L. PUTNAM.—Manchu and Muscovite. Being Letters from Manchuria, 1903. (Illustrated.) London, Macmillan & Co., 1904. 8vo.

AUSTRALASIA.

ROWLAND, PERCY F.—The New Nation: A Sketch of the . . . Australian Commonwealth. London, Smith, Elder & Co., 1903. 8vo.

SMYTHE, MRS. (S. M.)—Ten Months in the Fiji Islands. Maps, &c. Oxford and London, J. Henry and J. Parker, 1864. 8vo.

SPENCER, B., AND GILLEN, F. J.—Northern Tribes of Central Australia. (With maps, &c.) London, Macmillan & Co., 1904. 8vo.

EUROPE.

COOK, JOEL.—Switzerland: Picturesque and Descriptive. Illustrated. Philadelphia, Henry T. Coates & Co., 1904. 8vo.

CRUDEN, ROBERT PIERCE.—History of the Town of Gravesend, in the County of Kent, and of the Port of London. (Illustrated.) London, W. Pickering, 1843. 8vo.

ERÖDI, BÉLA.—Geographical Science in Hungary. Paper presented to the Eighth International Geographical Congress in America, Sept., 1904. [Hungarian and English Text.] Budapest, 1904. pr., 8vo. [*Gift, from the Author.*]

GARDNER, EDMUND G.—The Story of Siena and San Gimignano. Illustrated. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

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GRIECHENLAND.—Handbuch für Reisende von K. Bædeker. Mit Panorama von Athen, 11 Karten, 19 Plänen, 5 Grundrissen u. 2 Tafeln. 4te Auflage. Leipzig, K. Bædeker, 1904. 16mo.

HEADLAM, CECIL.—The Story of Nuremberg. Illustrated. London, J. M. Dent & Co., 1901. 16mo. *Mediæval Towns Series.*

ITALY from the Alps to Naples. Handbook for Travellers. By K. Bædeker. 26 maps and 44 plans. Leipsic, K. Bædeker, 1904. 16mo.

NOYES, ELLA.—The Story of Ferrara. Illustrated by Dora Noyes. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

PARIS AND ENVIRONS, with Routes from London to Paris. With 13 maps and 38 plans. Leipzig, K. Bædeker, 1904. 16mo.

PENCK, ALBRECHT.—Der Bodensee. (Mit einer Karte.) Vorträge des Vereines zur Verbreitung naturwissenschaftlicher Kenntnisse in Wien. XXII Jahrgang. Heft 6. Wien, 1902. 16mo.

PETERS, CARL.—England und die Engländer. 2te Auflage. Berlin, C. A. Schwetschte und Sohn, 1905. 8vo.

PEUCKER, K.—Kleines Orts-Lexikon von Österreich-Ungarn, &c., &c. Wien, Artaria & Co., 1904. 16mo.

PHILIPPSON, ALFRED.—Das Mittelmeergebiet. Seine Geographische und Kulturelle Eigenart. 10 Karten, Tafeln, &c. Leipzig, B. G. Teubner, 1904. 8vo.

WHEATLEY, H. B.—The Story of London. Illustrated. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

GEOGRAPHY.

BRIGHAM, ALBERT PERRY.—Students' Laboratory Manual of Physical Geography. (Illustrated.) New York, D. Appleton & Co., 1905. 12mo. *Twentieth Century Text-Books.*

DODGE, RICHARD ELWOOD.—Elementary Geography; Advanced Geography. (Maps and Illustrations.) Chicago, Rand, McNally & Co., 1904. 2 vols., 4to.

GÜNTHER, SIEGMUND.—Geschichte der Erdkunde. (*Die Erdkunde herausg. von Maximilian Klar, I. Teil.*) Leipzig u. Wien, Franz Deuticke, 1904. pr., 8vo.

HUXLEY, T. H.—Physiography: An Introduction to the Study of Nature. Revised and Partly Rewritten by R. A. Gregory. Illustrations. London, Macmillan and Co., 1904. 8vo.

KNOX, ALEXANDER.—Glossary of Geographical and Topographical Terms, &c. *Stanford's Compendium of Geography and Travel* (*Supplementary Volume*). London, Edward Stanford, 1904. 8vo.

MCMURRY, CHARLES A.—Excursions and Lessons in Home Geography. [Illustrated.] New York, The Macmillan Co., 1904. 16mo.

RUSSELL, ISRAEL C.—Co-operation among American Geographical Societies. An Address before the Section of Geology and Geography, American Association for the Advancement of Science, Philadelphia Meeting, Dec. 27–31, 1904. *Advance pages from the Proceedings Am. Ass., Vol. LIV, 1905.* Washington, D. C., Gibson Bros., 1904. pr., 8vo. [*Gift, from the Author.*]

WAGNER, HERMANN.—Lehrbuch der Geographie. *1ter Band:* Einleitung. Allgemeine Erdkunde. Mit 85 Figuren. Hannover u. Leipzig, Hahn'sche Buchhandlung, 1903. 8vo.

XUM

WITTRISCH, MAX.—Methodisches Handbuch für den Unterricht in der mathematischen Geographie in der Volksschule. [With cuts.] Halle a. d. Saale, Hermann Schroedel, 1904. 8vo.

MAPS AND ATLASES.

[ARCTIC.] SECOND NORWEGIAN POLAR EXPEDITION in the "Fram," 1898–1902. Seven maps by Capt. G. I. Isachsen. Lithographed in colour. *From "New Land" by Otto Sverdrup.* (1.) Map showing the area mapped by the expedition. *Scale:* 1: 2,000,000=31.56 miles=1 inch. *Size:* 18⅛ x 22¾ inches; (2.) Buchanan Bay and Bache Peninsula. *Scale:* 1: 410,000=6.4 miles=1 inch. *Size:* 13¼ x 7 inches; (3.) *The same*, Norwegian text. *Scale:* 1: 200,000=3.1 miles=1 inch; (4.) Western Part of Jones Sound. *Scale:* 1: 410,000=6.4 miles=1 inch. *Size:* 7⅛ x 12½ inches; (5.) *The same*, Norwegian text. *Scale:* 1: 200,000=3.1 miles=1 inch; (6.) Havnefjord with Sydkapfjord. *Scale:* 1: 348,480=5.5 miles=1 inch. *Size:* 4 x 12 inches; (7.) Jones Sund. *Scale:* 1: 1,140,600=18 miles=1 inch. *Size:* 15 x 6½ inches. [*Gift, from Capt. G. I. Isachsen, Christiania.*]

ATLANTE DELL' AMERICA contenente le migliori carte geografiche e topografiche delle principali Città, Laghi, Fiumi e Fortezze del Nuovo Mondo. Livorno, G. T. Masi, 1777. Folio.

CEYLON.—From Surveys . . . 1896–1903. F. H. Grinlinton, Surveyor-General. *Scale:* 1:506,880=8 miles=1 inch. Colombo, Survey Department [1904]. Colored, mounted as a wall-map. [*Gift, from the Survey Department, Colombo, Ceylon.*]

CHILE.—Five Charts of the Coast, published by the Oficina Hidrográfica, 1903–1904. Various scales and sizes:

No. 102: Golfo Corcovado [3 Charts on one sheet], Bahia Tic-Toc; Puerto Auchemó; Puerto Yelcho.

No. 103: Estuario i Canal Baker.

No. 104: Canal Messier, Puertos en el Estuario Baker [13 Charts on one sheet], Puerto Merino Jarpa; Caleta Laguera; Puerta Valdés; Caleta Dewet; Puerto Valenzuela; Puerto Cueri-Cueri; Puerto Tres Meses; Puerto Contreras; Puerto Alvarez; Puerto Brown; Rio Huemules; Puerto Queltehue; Puerto Francisco.

No. 105: [2 Charts on one sheet], Puerto Zapallar; Bahia de Papudo.

No. 114: Bahia de Quintero.

[*Gift, from the Oficina Hidrogrdfica, Valparaiso, Chile.*]

[CHINESE MAPS, ANCIENT. 13 sheets, each 14 x 12 inches, folded in 12mo book form, pigskin covers.]

LA PAZ. [Bolivia.] Ensanche de la Ciudad, 1903. Escala, 1:1,000=83 feet= 1 inch. *Size:* 23½ x 17 inches. [*Gift, from the Oficina Nacional de Inmigración Estadística y Propaganda Geográfica, La Paz.*]

LA PAZ. [Bolivia.] Plano de la Ciudad. Levantado por la Comision Topográfica, 1902. *Scale:* 1:4,000=333 feet=1 inch. *Size:* 27 x 17½ inches. Colored. [*Gift, from the Oficina Nacional de Inmigración, Estadística y Propaganda Geográfica, La Paz.*]

LONDON AND ITS ENVIRONS—ORDNANCE SURVEY MAPS.

1. Scale of 6 inches to 1 mile=1:10,560. Revised, 1891 to 1895. 48 Sheets. *Size:* [of each sheet] 18 x 12 inches. 1902–1904.

2. Scale of 6 inches to 1 mile=1:10,560. Skeleton Map. Survey of 1848–50 (Unrevised). Sheet 7. *Size:* 35¾ x 24 inches. 1865.

3. Scale of 12 inches to 1 mile=1:5,280. Skeleton Map. Survey of 1848–50 (Unrevised). Sheet VII. S. E. *Size:* 35½ x 24 inches. 1851.

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4. Scale of 25.344 inches to 1 mile=1:2,500. Survey of 1862–73. Sheet XLIV. *Size:* 33¾ x 24¼ inches. 1879.

5. Scale of 5 FEET to 1 mile=1:1,056. Survey of 1873–75 (Unrevised). Sheet VII. 66. *Size:* 35½ x 24 inches. 1875.

6. Scale of 3 inches to 1 mile=1:21,120. Index to the Revised Survey of London on the Scale of 5 feet to 1 mile. Edition of 1894–95. 5 Sheets, various sizes. 1897.

Southampton, Ordnance Survey Office.

[MAGELLAN STRAIT, PARTS OF.]—Two Charts published by the Oficina Hidrográfica, Chile, 1903. Various scales and sizes:

No. 94: [2 Charts on one sheet], Puerto Condor, Canal Jerónimo; Bahia Sholl, Canal Magdalena (Tierra del Fuego).

No. 95: [2 Charts on one sheet], Canales de Entrada de la Bahia Jente Grande; Bahia Jente Grande. [*Gift, from the Oficina Hidrográfica, Valparaiso.*]

MASSACHUSETTS, Official Topographical Atlas. Compiled by Walling & Gray. Boston, Stedman, Brown & Lyon, 1871. Square folio.

VARIOUS.

ALMANACH DE GOTHA, 1905. Annuaire Généalogique, Diplomatique et Statistique. Gotha, Justus Perthes (1904). 16mo.

AMERICAN BOOK PRICES CURRENT, 1904. Compiled from the Auctioneers' Catalogues by Luther S. Livingston. New York, Dodd, Mead & Co., 1904. 8vo.

ATOLL OF FUNAFUTI: Borings into a Coral Reef and the Results. Being the Report of the Coral Reef Committee of the Royal Society. 1 vol. (Illustrated) and Case of Maps. London, Royal Society, 1904. 4to.

BOEHM, EDGAR COLLINS.—The Persian Gulf and South Sea Isles. (Illustrations.) London, Horace Cox, 1904. 8vo.

DEHN, PAUL.—Weltwirtschaftliche Neubildungen. 2te Auflage. Berlin, Allgemeiner Verein für Deutsche Litteratur, 1904. pr., 8vo.

DEUTSCH-UNGARISCHES und Ungarisch-Deutsches Wörterbuch. Pesth, A. Hartleben, 1827. 2 vols., 8vo.

DICTIONARY of National Biography. Errata. London, Smith, Elder & Co., 1904. 8vo.

DUNSTAN, WYNDHAM.—Report to the Board of Trade on Cotton Cultivation in the British Empire and in Egypt. (With map, etc.) Presented to both Houses of Parliament. London, H. M. Stationery Office, 1904. Folio.

DUTTON, CLARENCE EDWARD.—Earthquakes: in the light of the New Seismology. Illustrated. New York, G. P. Putnam's Sons, 1904. 8vo.

EGERTON, HUGH EDWARD.—Origin and Growth of the English Colonies and of their System of Government. An Introduction to Mr. C. P. Lucas's Historical Geography of the British Colonies. (8 maps.) Oxford, Clarendon Press, 1903, 16mo.

ENCYCLOPEDIA, JEWISH.—Vol. VIII. Leon–Moravia. *Illustrated.* New York and London, Funk & Wagnalls Co., 1904. 8vo.

[ENCYCLOPÆDIA.] MEYERS Grosses Konversations-Lexikon. (6te Auflage.) Band VIII. Leipzig u. Wien, Bibliographisches Institut, 1904. 8vo.

GRAY, ASA.—Scientific Papers of. Selected by Charles Sprague Sargent. Boston, Houghton, Mifflin & Co., 1889. 2 vols., 8vo.

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GRIERSON, P. J. HAMILTON.—The Silent Trade. A Contribution to the Early History of Human Intercourse. Edinburgh, William Green & Sons, 1903. 8vo.

HARASZTHY, A.—Grape Culture, Wines and Wine-Making. With numerous illustrations. New York, Harper & Bros., 1862. 8vo.

JAHRBUCH DES OESTERREICHISCHEN ALPEN-VEREINES. Bände 2–26, 1866–1895. [With maps and plates.] Wien, München, et al. 28 vols. in 19. 8vo.

JURIEN DE LA GRAVIÈRE, E.—Guerres Maritimes sous la République et l'Empire. Nouvelle edition, revue, corrigée et tres augmentée. Plans des batailles navales . . . . et Carte. Paris, G. Charpentier, 1883. 2 tomes, 12mo.

MCGREGOR, A. W.—English-Kikuyu Vocabulary. Compiled for the use of the C. M. S. Missions in East Africa. London, Soc. for Promoting Christian Knowledge, 1904. 16mo.

MILNE, JOHN.—Earthquakes and Other Earth Movements. 5th Edition. With figures. London, Kegan Paul, Trench, Trübner & Co., 1903. 8vo.

OPPEL, A.—Die Baumwolle, nach Geschichte, Anbau, u. s. w. Mit 236 Karten u. Abbild. Leipzig, Duncker & Humblot, 1902. 8vo.

RATZEL, FRIEDRICH.—Über Naturschilderung. Mit 7 Bildern in Photogravüre. München und Berlin, R. Oldenbourg, 1904. 8vo.

RIBBE, CARL.—Zwei Jahre unter der Kannibalen der Salomo-Inseln. Unter Mitwirkung von Heinrich Kalbfus. Abbild., Tafeln und 3 Karten. Dresden-Blasewitz, Hermann Beyer, 1903. 8vo.

THIMM, C. A.—Dutch Self-Taught. With Phonetic Pronunciation. London, E. Marlborough & Co., 1904. 16mo.

TOWNSEND, MEREDITH.—Asia and Europe. 2nd Edition. New York, G. P. Putnam's Sons, 1904. 8vo.

VIGNAUD, HENRY.—La Maison d'Albe et les Archives Colombiennes. Avec un Appendice . . . ., et un Tableau Généalogique. *Extrait du Journal de la Société des Américanistes de Paris, tome 1er, no. 3.* (Paris), Siège de la Société, 1904. pr., 8vo. [*Gift, from the Author.*]

WANG, FERDINAND.—Grundriss der Wildbachverbauung. *2ter Theil.* Abbild. und Figuren. Leipzig, S. Hirzel, 1903. pr., 8vo.

WEINTZ, H. J.—Japanese Grammar Self-Taught. (In Roman character.) With Phrases and Idioms. London, E. Marlborough & Co., 1904. 8vo.

BOOK NOTICES.

The Persian Gulf and South Sea Islands. By Edgar Collins Boehm. xiii and 189 pp., 15 illustrations, and Index. Horace Cox, London, 1904.

The interest of this narrative of travel is enhanced by the fact that the author, in his visit to the Persian Gulf, had the chance of seeing many out-of-the-way places that tourists seldom happen upon. His descriptions, therefore, of pearl-fishing at the Bahrein Islands, of the Tigris and Euphrates Rivers, of Muscat and Bagdad, and of other scenes will be entirely new to many readers. He says that visitors to the Persian Gulf should be equipped with useful letters of introduction, as there are no hotels, and when the steamers depart one is entirely dependent upon the hospitality

and advice of the residents. Those who travel inland, off the beaten tracks and without consular assistance, take their lives in their hands, and are at the mercy of thieves and brigands. The chapters on the Pacific Islands are entertaining reading, with nothing especially new about them excepting some rather gruesome pictures of the old days of cannibalism in Fiji.

Further India, being the Story of Exploration from the Earliest Times in Burma, Malaya, Siam, and Indo-China. By Hugh Clifford. 367 pp., 48 illustrations, including black maps; also a map in colours, bibliography, and index. Frederick A. Stokes Company, New York, 1904.

Mr. Clifford has written an able and an erudite book on the exploration of the Indo-China Peninsula. These countries failed for centuries to appeal strongly to the imagination of the European peoples, the author thinks, because they lie midway on the sea route from India to China and have been overshadowed by the immensity and the surpassing fascination of their mighty neighbours. The real exploration of this region beyond the limits of the coast lands was not accomplished until during the latter half of the nineteenth century; and the world at large still knows little of this great work of exploration carried out by Francis Garnier and other remarkable men.

The author traces the knowledge gained by Europeans of these lands from the earliest days until the time in the last century when the spread of European influence made the scientific exploration of the *Hinterland* a possibility. Then the story of Garnier's work and that of his successors is told with graphic and sympathetic power; and the final chapter shows us the great peninsula as it now stands revealed through the completed work of these explorers. The book supplies a lack in the history of exploration, for nothing has hitherto been published in comparatively small compass that gives so complete an idea of the means by which we finally arrived at our present knowledge of the geography of the Indo-China Peninsula.

Durch die Urwälder Südamerikas. Von Capt. Albert Perl. 235 pp., 60 illustrations, and a map. Dietrich Reimer (Ernst Vohsen), Berlin, 1904. (Price, 8 m.)

The writer lived about eight years in the rubber forests of the Amazon basin, travelled up the Amazon to its sources, and also along the Madeira, Purus, Beni, Madre de Dios, Acre, and other rivers from their mouths to their fountainheads, besides taking long trips among the Andes and along the Pacific and Atlantic coasts. Business, and not geography, impelled him; but his book was well worth writing, and may be recommended to all readers of German who would like to know more of the little-known phases of life in the great forest regions of South America. The book abounds with stories of interesting personal experience, with sketches of nature and of phases of natural history, with glimpses of the perils of navigation and of the dangers of the climate; and one gets an idea of the Indians and of the very rough white citizens who have been drawn together into these dark forests by the attraction of rubber. It is doubtful if this book has a counterpart as a faithful description of pioneering in the rubber regions of the Amazon.

Dodge's Advanced Geography.—Part I. Principles of Geography. Part II. Comparative Geography of the Continents. By Richard Elwood Dodge. 4to. Chicago, Rand, McNally & Co. (1904).

In Part I of this book the author has treated the subject in a clear and simple form. The style is animated, and the pages are made attractive by excellent illustrations, though the plates devoted to heat-belts and temperature, and those showing

the winds, are unsatisfactory, because of the faint outline of the continents. This defect seriously interferes with the possibilities of inductive work. Quite in contrast are the excellent plates on page 52 showing atmospheric pressure and winds with accompanying storm areas, in the United States, for two consecutive dates.

The Second Part of the book, on the comparative geography of the continents, begins with North America. Existing conditions are discussed in their geographical significance, according to the author's plan in Part I. But this section seems to lack the dignity and terseness so manifest in the preceding chapters. The human element is not sufficiently emphasized. Notwithstanding this limitation, Part II has value, for the text is so profusely illustrated with well-chosen subjects that intensive work may be accomplished with the pictures, exclusive of the text. Scales illustrating the rank of countries, in commerce and important crops, occur at frequent intervals. The reference tables at the end of the book include some of the great trade routes and a list of important commercial countries, with their leading productions, exports, and imports. Such statistics, in the hands of an able teacher, will furnish the basis for geography lessons that will give the pupils a broader understanding than can be obtained from a mere description.

The book includes a large number of maps, physical, political, and commercial. Of these the first show the highest degree of excellence. The colour scheme is satisfactory and the names are in clear type. These maps are exceptional in certain respects. The clever device used to show the drainage divide and the marking of the climatic zones by their special isotherms afford an opportunity for deductive work that is not attainable in the usual physical map. The legend has a unique plan for explaining the colour scheme of ocean depths and land elevations.

Many of the political maps are clear and the names are printed in plain type. Of these the map of the United States is a good example. The same cannot be said of certain sectional maps. Those of the Mississippi Basin might be of more use if fewer names were printed and a larger type used. The multitude of dots, for towns and villages, and the fine print do not seem to have been dictated by geographical considerations..

Railroad routes are scantily indicated on commercial maps only, and those maps are so crowded with names that successful teaching is impossible.

Such defects in this otherwise excellent book prove the impossibility of arranging a text-book and an atlas in the same volume.

The book has a complete index and the suggestions for collateral reading, at the end, show care in selection. Pages are often specified in the books mentioned, and the references are classified according to the various chapters in this book.

With its wealth of pictures and an individual plan, this book has a high rank as a text-book of geography.

M. E. K.

Adelphi Academy.

The Countries of the King's Award. By Col. Sir Thomas H. Holdich. xv and 420 pp., 93 reproductions from photographs and a map. Hurst & Blackett, London, 1904.

Sir Thomas Holdich's visit to Argentina and Chile as a member of the Tribunal of Arbitration in the boundary dispute was not a long one, but he had exceptional opportunities to see a large extent of both countries, and his trained geographic instinct gives special value to his comments on what he saw. He describes the Andean region through which the boundary passes, most of which was practically unknown until revealed by the survey. This is the first detailed account of the

region, and it is of much geographic interest. The Commission's examination included 800 miles of linear geography in one of the roughest regions in the world. Sir Thomas thinks that the prospects of both countries are bright. He says:

> Both countries possess a climate in which strong men are reared; . . . . and that, equally, the two States may share the advantages of the constant intercourse with Europe which will be gained by the future existence across them of one of the main commercial ways of the world. Trans-Andine railways will, ere long, develop to a Trans-Patagonian route to Australia from Europe and the establishment of important commercial centres at other points than Buenos Aires and Santiago . . . . But Chile and Argentina want immigrants, but immigrants of the right sort . . . . who come to stay, and who will, in the magnificent climate of those southern lands, people the country with a race physically powerful and intellectually keen. And they want decentralization—less crowding in the capitals and a more scattered population in provincial centres and country towns. All this can only result from wider extension of means of communication and the wider spread of those necessities of civilization which make a wilderness habitable.

Sir Thomas gives many interesting facts relative to the people and industries of Argentina and Chile, the physical aspects of both countries, their railroads and traffic, and the colonies in Patagonia and the Andes. A chapter is given to Tierra del Fuego and its natives, another to southern Patagonia, and others to Buenos Aires and Santiago. The work is a fine specimen of book-making and is beautifully illustrated, most of the pictures being typical views of the southern part of South America.

England und die Engländer. Von Dr. Carl Peters. Second unaltered edition. vii and 284 pp., and an index. C. A. Schwetschke & Son, Berlin, 1905. (Price, m. 6.)

Dr. Peters says that his views of England and its people are based upon his own observations and experiences among all classes of society during more than ten years. He adds that, as he has endeavoured to treat many aspects of a great nation, it is impossible that he should not at times have fallen into error, in which opinion the English heartily agree with him, as they are by no means ready to accept Dr. Peters's dictum as to the nature and bent of their national genius and their present position in the world. He has not a few kindly words for the English and their institutions, but, on the whole, they are, he thinks, in a state of intellectual decadence; they are immoral, and are being outstripped by other nations in industry and commerce. At the same time, the author pays due tribute to the qualities that made the English the builders of a mighty empire. Dr. Peters invests his descriptions of London, Parliament, politics and the press, education, social life, and other topics with an interest that never flags, and he seasons the whole with a sprinkling of cynicism and a somewhat caustic humour. To say the least, the book is very readable.

Die Lüneburger Heide. Von Dr. Richard Linde. 149 pp., 111 photographic illustrations, a map in colours, and index. Velhagen & Klasing, Bielefeld und Leipzig, 1904.

The book fully sustains the reputation which the earlier volumes have given to the excellent "Land und Leute" series—and this without having the advantage of fine and inspiring landscapes to heighten the charm of the many illustrations, for the Heath of Lüneburg, to the east of the Plain of Hanover, is one of the least picturesque parts of Germany, although flowers, clumps of trees, ravines and a boundless horizon give the low plain more attractions than some visitors have accorded to it. The numerous photographs show that even this sterile tract has its peculiar charm, and the glimpses they give of the humble life of the peasants, of the flocks of sheep that hold undisputed possession and adorn many of the landscapes, of the forests of birch, oak and beech that grow luxuriantly in the bottom lands, and of the agricul-

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tural settlements, many of which are newly formed, are very interesting. A fine map enhances the pleasure and profit of reading the book. This region is only two hours from Hamburg, the Elbe skirts its northeast part, and it is well worth a visit.

Griechenland. Von K. Baedeker. (Fourth Edition.) cxxxiv and 438 pp., a panorama of Athens, 11 maps, 24 plans and 2 tables. Karl Baedeker, Leipzig, 1904. (Price, m. 8.)

The facilities for visiting the oldest home of the beautiful in art have been improved, and the number of tourists to Greece is increasing every year. The first edition of this handbook was issued in 1882, and was based upon the manuscript of the late Dr. G. Lolling, one of the leading authorities on Greece of that day. To secure the latest material for the present edition, Dr. Dietrich Bender, of Leipzig, has travelled over the larger part of the kingdom, and the volume shows the great progress in archæological exploration and the development of means of communication, which enables tourists to extend their travels in the East. Other authorities have written the sections concerning such special points of interest as Olympia and Delphi, and the descriptions of Crete and the smaller islands are entirely new. Large parts of the archæological descriptions also appear in this edition for the first time. The maps have been re-drawn and the plans have been revised and increased in number. The volume shows that no pains have been spared to make it adequate to the needs of tourists.

Die Entwicklung des deutschen Wirtschaftslebens im 19. Jahrhundert. Von Prof. Dr. Ludwig Pohle. (5 Lectures.) vi and 132 pp. No index. B. G. Teubner, Leipzig, 1904. (Price, m. 1.25.)

Dr. Pohle delivered these lectures, on the economic development of Germany in the past century, at Frankfort in the winter of 1903–04. In the first lecture he gives a general view of this development, with special reference to the changes in the activities of the people, brought about by the transformation of the country from an agricultural to an industrial state; the second lecture deals with the changes caused by the influence of agrarian reforms and the pressure of increasing population. The third discusses the position of the old industrial forms of hand-work and household manufactures; the fourth treats the development of the great industries and their accompanying phenomena; and the fifth, the growth of commerce and communications. The nation made wonderful progress in population, power, and freedom, because its industrial life was wholly transformed by the modern idea of employing large capital in business and by new facilities for communications and new methods in banking and trade. This transformation brought great blessings to the nation, but not without inflicting much suffering, and even ruin, upon many thousands of individuals, the victims of the economic battle. The statistics of the subject could scarcely be introduced in this brief but forceful presentation. The author gives a list of the German books in which the subject, in some or many of its phases, is more fully treated.

Pioneering in Central Africa. By Samuel P. Verner. ix and 500 pp., 14 half-tone pictures, 5 maps, and an index. Presbyterian Committee of Publication, Richmond, 1903. (Price, $1.75.)

This is one of the best books yet written on any part of the Congo basin. Mr. Verner had experience in practical affairs, such as railroad transportation, the care and running of machinery, and carpentry, before he went to the Congo in 1896 as business

manager of a missionary enterprise at Luebo in the south central part of the Congo basin, about 1,000 miles from the mouth of the river. This work was an attempt to utilize the American negro to elevate his sable brothers in the heart of Africa. The enterprise is manned chiefly by coloured persons from Mississippi, Virginia, and Alabama, and the fact that it has accomplished most practical and useful results points to the efficiency of the mission. Mr. Verner extended the work over 50 miles to the southwest of Luebo and devoted three years to its interests. He returned to that region last year and brought back with him the pygmies who were seen at the World's Fair in St. Louis.

Mr. Verner is more sanguine than many writers on Africa, and the facts he gives seem to justify his faith in the future of the continent. He praises in the highest terms the efforts of the Government of the Congo Free State and of the missionaries, both Protestant and Roman Catholic, for their philanthropic and educational work among the natives. Both the Government and the missionaries give assiduous attention to the maintenance of schools which include excellent training in carpentry, cabinet work, brickmaking, printing, tailoring, agriculture, and other industrial branches.

He thinks the natives have large capacity, and regards them as wonderfully adept in many branches of work, such as blacksmithing, cloth and mat weaving, wood working, pottery, tanning, house building, etc.; but the coming generations will be able to do much more than the adults of to-day for the reclamation of Africa:

> The hope for heathen and barbarous races lies in their children; and the marvelous progress made by these African youth in accommodating themselves to the changed conditions, in assimilating Christian ideas, and in adopting the Western civilization was the most hopeful fact I observed during my life in Africa (p. 129).

A large factor in the progress of the natives is the prohibition of the sale of spirituous liquors among them:

> It was a matter of gratification that the international prohibition of the importation and sale of intoxicating liquors in the Central African Zone was so effectively executed. There was, therefore, almost no drunkenness at all among the natives. The sap of the oil palm which made the famous palm wine was unusually mild and innocuous, and only when fermented was it sufficiently alcoholic to intoxicate (p. 137).

Mr. Verner was especially impressed with the agricultural and mineral resources of the part of the Kasai basin in which he lived, with the intelligence, ability and progressive ideas of Ndombe, the King who rules over a large district in that region, and with the possibility of white colonization in some parts of the high plateau of the Congo basin. He speaks of the Congo railroad around the 235 miles of cataracts in the lower river as very remarkable in its success:

> So well have the projectors of this railway been rewarded for their faith and daring that the stock of the railway, at a par value of 100, stands now, ten years since the beginning of construction, at over 4,000 on the Bourse of Brussels, and the profits of the original investors have been enormous. The railway has practically a monopoly of all the transportation for the whole immense Congo Valley (p. 59).

The book should be read by all who are interested in the present condition of tropical Africa and the development in progress.

The Congo. By Roland de Marès. vi and 118 pp. J. Lebègue & Co., Brussels, 1904. (Price, 1 fr.) (In English.)

Articles printed in the *Indépendance Belge* during June and July, 1904, in reply to attacks upon the Congo Free State.

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Les Mines de l'Afrique du Sud. Par Albert Bordeaux. viii and 211 pp. 8 plates of maps and plans and index. Vve. Ch. Dunod, Paris, 1898.

This is not a new book, but the geological facts and much other information require no change to adapt them to existing conditions. The work treats of most of the gold and diamond mines of South Africa, including the less-known districts, as well as the great mines of the Rand and Kimberley. It is the result of three years of study in these mining regions by an accomplished mining engineer of France.

The Policy and Administration of the Dutch in Java. By Clive Day. xxi and 434 pp. and index. The Macmillan Company, New York, 1904. (Price, $2.)

A scientific history in English of the experience and work of the Dutch in Java would long ago have been welcomed as a most valuable chapter in the annals of colonial enterprise. Unfortunately, a satisfactory work of this kind has never been accessible to English-speaking students of colonial affairs. This book, by the assistant Professor of Economic History in Yale University, fills the need, and may be regarded as one of the most important contributions to colonial topics that has been made in a long time.

Mr. Day found his material in the writings of the Dutch historians, and in original documents covering the whole period of the Dutch occupancy from early in the 17th century, when the Dutch East India Company began its operations in Java, until modern conditions in government supplanted the older policies. The last three chapters describe the most recent methods of the Dutch régime and connect the past of Java with its present.

The history of Java before the arrival of the Dutch is treated with especial reference to the native political and economic organization, the absolutism of the rulers, and its bad effects, the weakness and corruption of the Governments and the unfavourable condition of the mass of the people. Then came the Dutch East India Company with gain as its only goal, a commercial policy based upon monopoly, and a Government marred by inefficient fiscal administration and corruption among the officials. The reasons for the decline of the Company's commerce and for its final ruin are discussed; and the coming into power of Governor-General Daendels is described, with his arbitrary rule, his fiscal difficulties, his abuse of the forced-labour system, and his genuine reforms. Then follows the period of British occupation and rule, with its failures and partial successes, and the Dutch restoration, ushering in the famous régime of Van den Bosch, with his forced labour and the high profit which it yielded to the home Government.

The author believes that the abuses of this period followed in the main as a result of the principle of forced labour under Government management for Government profit:

> The Dutch made money for a time, but they sacrificed their permanent interests in the process. They prevented the education of native laborers; they prevented organization by European planters, and the revenue that they got was no compensation for the check on Java's productive power (pp 341–342).

The closing chapters discuss the recent economic policy, with the exploitation of Java's resources largely in the hands of capitalists, the modern government and provincial administration and the fiscal policy. The Government has taken to itself the property right in land, but has left the natives in hereditary possession. There can be no transfer of rights from natives to non-natives, no valid sale to a foreign Oriental or to a European. The foreign planter, who now figures so largely, can lease land for a short term, but cannot purchase it. The impossibility under the laws of alienating landed property is a great blessing to the Javanese.